PROBLEMS AND PROSPECTS OF PRIVATE SECTOR PARTICIPATION IN POWER GENERATION IN UTTAR PRADESH

ABSTRACT

OF THE

THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

Ph. D. (BUSINESS ADMINISTRATION)

BY

ASHEESH SRIVASTAVA

UNDER THE SUPERVISION OF

Dr. Mohd. Afaq Khan
Assistant Professor
Dept. of Business Administration
Faculty of Mgmt. Studies & Research
Aligarh Muslim University, Aligarh
(Internal Advisor)

Prof. R. C. Katiyar
Former Director & Dean
Institute of Business Management
CSJM University, Kanpur
(External Advisor)

DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF MANAGEMENT STUDIES & RESEARCH
ALIGARH MUSLIM UNIVERSITY
ALIGARH - 202002 [INDIA]

2013

Abstract

Over the past decades a growing number of developing countries have opened their Electricity (Power) industry to the private sector participation in view of the need to expand the capacity or increase the reliability of systems, or both. There is a global opinion that in view of the public sector budget constraints and the positive results of the early experiments with private sector participation as realized, the condition is encouraging throughout the world.

Indian reform legislation has been more on improving financial viability of power sector than on improving access to electricity. These attempts are not addressing core issues like consumer interest, supply of reasonable power and quality of power. Despite substantial reforms and incentives, due to uncertain prospects of getting paid for their supplies private investors held back from investing in the sector. In view of inadequate cost recovery and the limiting factors one of which is essentially a single-buyer market, the reforms turned out to be unsustainable. It may further be seen that momentum for sustainability is derived from people. The solutions proposed are not limited to the provision of products and services to cater to the unmet needs of Indians, from the viewpoint of consumers, but to think of them as partners and allies in the fight for sustainability. In the perspective of its socio-economic realities, role of government becomes important.

Unbundling of state power entities combined with deregulation has been very successful in significantly improving the efficiency of the power sector in those countries that have done it. Primary advantage of this method is that, by deregulating to open competition, the industry functions at much higher levels of efficiency.

The reforms are hindered by problems such as litigation, financial arrangements and obtaining clearances and fuel supply agreements. With the tariffs reflecting high capital costs and returns on equity, additions to the generation capacity without corresponding improvement of the transmission and distribution facilities are likely to further undermine the system efficiency.

Introduction of Power sector

The Power Sector is striving to meet the challenge of providing adequate power needed to fuel the growing economy of the country. However, this growth of the Power Sector has to be within the realms of the principles of sustainable development. Thrust is also accorded to maximizing efficiency in the entire electricity chain, which has the duel advantage of conserving scarce resources and minimizing the effect on the environment.

Power generation costs are the key to determining the best generation mix for a reliable supply of electricity while making it available for use economically. With an increasing demand for power for economic development, countries around the world need to evaluate the present and future costs of generating electricity using the presently available and expected power generation technologies of future. Evaluating the cost of power generation depends on various factors that are responsible for driving the prices of electricity. The most important factors driving the power generation costs are government policies and incentives, capital (investment cost), fuel costs and Operations & Maintenance cost.

In the 12^{th} five year plan there is going to be a larger role of private sector in further capacity addition. Government of India has tried to reform the Power sector since very beginning as per the changed requirements and as per the need of the hour. This has made significant impact on the scenario of power generation in the country. It becomes more encouraging for private sector participation in view of the potential to grow and with the advent of new technologies and changing economic scenario across globe, the sector may lead towards a market driven mechanism of tariff fixation. This will not only make the Government free from the burden of subsidy but explore the potentials of market driven economics in the country.

Although many countries have expressed some dissatisfaction with the operation of their state-owned power sector, there has been a wide range of responses to the problems perceived. Some countries have felt it impossible or undesirable to embark on any reform strategy that requires opening electricity production or sales to private participants, whereas other countries, although willing to engage private participation, have chosen very different strategies for doing so.

Survey of literature

The literature review conducted here has been taken in the above perspective and thus the papers relating to that are mostly of post 1991 era for Indian context, however the case of other developing countries have been accordingly taken as per their respective years of sectoral reforms and private sector participation in those countries. The literature review focuses upon the following aspects in the context of the Research work.

1) Need of private sector participation in power generation
2) Drivers of private sector participation in power generation
3) Sustainability of private sector power projects
4) Availability of resources for capacity addition
5) Privatization in various developed and developing countries

1) Need for Private Sector Participation in Power Generation

Various authors like Puneet Chitkara, et.al. , (2001) have stated that there is a general opinion that the reforms should start with privatization of Power generation. Others believe that the government has started at the wrong end by not beginning the reform process with privatization of distribution. Tongia Rahul (2003)has described the political aspects of the Indian economy with special reference to power sector. After independence the Indian economy followed a socialist path, with the state assuming an ever-larger role in economic activity. Balachandra (2006) has discussed the implications of such private sector participation in power generation on various stakeholders, viz., public utilities, consumers and private sector and the study attempts to analyze issues like planned rationing, guarantees to private sector, backing down of existing capacity. Waquar Ahmed (2007) has examined the evolution of electric-power policy in India adopting a political-economy approach by drawing linkages between global and local/national discourses, of development. Dubash Navroz K. and Sudhir Chella Rajan (2001), have provided an analysis of the social and political context in which power sector reforms have taken place in India. They have focused on the character and effects of those reforms and the

roles and responses of different players. Woods Laura (2011) has highlighted the major opportunities present in Power Sector. The Indian Power Sector has been undergoing a rapid growth phase with a vision to provide reliable, affordable and quality power for all by 2012. In view of the above authors the main role of the government is to form policies and appoint regulators to provide a level playing field for all the player of power sector who are involved in the value chain of power generation upto distribution to end consumers.

2) Drivers of Private Sector Participation in Power Generation

Antonette D'Sa, et. al. (1999) have critically examined the various aspects of private sector participation in India's Power Sector .They report that Independent power producers (IPPs) claim that their progress has been hindered by problems such as litigation, financial arrangements and obtaining clearances and fuel supply agreements. On the other hand they found that, the State Electricity Boards have been burdened by power purchase agreements (PPAs) that favor the IPPs with such clauses as availability payment irrespective of plant utilization, tariffs reflecting high capital costs and returns on equity etc. Desai Vishvanath V. (2004) has reviewed the obstacles to private sector participation in India in power generation Industry. Desai has identified that there are several factors that have acted upon as obstacles to private investment in the power sector. Niranjan Swain, et al. (2004), have discussed the various inhibitors to growth in power sector but the major roadblock in the growth path, which made it difficult or rather impossible for a private player to enter is the Government Policy. Niranjan Swain (2004) further stated that the primary lesson in keeping the power sector under tight government regime was to have proper access, equity and distribution of power to various sections of society. The socialist dream did not materialize as the above benefits have not reached the general population. The most important aspect of sectoral reform is that, the various reforms as mentioned were not introduced all at one time, but in bits and pieces over a period of time, which should have been introduced in a single ambit to get the desired results.

3) Sustainability of Private Sector Power Projects

Saraswata Mohapatra (2010) has discussed as to how the private sector can contribute to realizing the purpose of these reform initiatives. The common thread across all the people-centric solutions is a strong understanding of the root cause of the troubles and challenges faced by Indians, as the momentum for sustainability is derived from people. According to Desai Vishvanath V. (2004) the dominant sector entities, namely the SEBs, are technically insolvent. They are unable to recover the costs of power supplied and remain burdened with ever-growing commercial losses. The power market in India is essentially a single-buyer market and the SEBs are the single buyer. Private power producers are therefore required to sell power to SEBs, who lack financial resources to pay for it. Santhakumar V. et. al. (2003) have concluded that factors that facilitate/discourage power sector reforms, are very important also in the context of assessing Indian economic reforms. It is emphasized that the proposed solutions are not limited to the provision of making products and services to cater to the unmet needs of Indians from the viewpoint of consumers but to think of them as partners and allies in the fight for sustainability.

4) **Availability of Resources for Capacity Addition**

Ravi Krishnan et. al., (2012) have stated that, India's long-term annual economic growth rate is projected at over 7%, and the country is investing in its hydroelectric, nuclear, and renewable resources. However, the primary fuel used to produce electricity remains coal, and the government has ambitious plans to significantly increase coal-fired capacity. Though the projected capacity additions are an impressive objective, in reality there have been and will continue to be shortfalls in capacity additions due to a variety of factors, including fuel constraints, regulatory and tariff issues, shortages of skilled manpower and construction equipment, infrastructure issues, and bureaucratic delays in obtaining clearances and permits. Ghosh Sukanya, et al. (2001), have reviewed the future prospects of Indian thermal power sector in the perspective of the depleting coal reserves of India and the deteriorating quality of the coal. As an alternative to the critical demand for power, country planners have concentrated more on commissioning of thermal power plants. Coal happens to be the basic fuel of any thermal power plant and India had a plentiful supply of this basic raw material until recently. In view of the total availability of natural gas in the country which is not very encouraging, the public and private sector

entities have embarked upon imported coal as a means to bridge the deficit. Coal is the mainstay of the power production in India and is expected to remain so in the future.

5) Privatization in Various Developed and Developing Countries

Philip Gray (2001), has reviewed the evidence on the extent to which private participation in developing countries have been achieved. First and foremost, private investors will only invest in infrastructure enterprises if the government gives a credible commitment to cost covering tariffs. Commitments of these kinds are far more durable than the same undertakings given to managers of public enterprises, who have limited leverage to negotiate commitments and no effective sanction if governments succumb to populist pressures to renege. Bacon R. W. et.al. (2002) have revealed that the sequencing of reforms is crucial to the long-term sustainability of electric power industry in developing countries. Harris Clive (2003) has reviewed private Participation in Infrastructure in developing countries, about the trends, impacts and policy lessons. Anoop Singh et al. (2005) in a review, of private investment in power sector in developing countries have emphasized that apart from macroeconomic stability, the pace and sequencing of reforms has a strong influence on private investment in the power sector. Yin-Fang Zhang, David Parker and Colin Kirkpatrick (2008) have reviewed the electricity sector reforms in developing countries. They have found that electricity sector reforms have altered significantly the sector's market structure and institutional framework. Over the last few decades' electricity sector in both developed and developing countries have been subject to restructuring to introduce private capital and increase competition. Cropper Maureen L. et al. (2012) estimated the impact of restructuring on electricity generation efficiency in the Indian Thermal Power Sector. They have examined the impact of the unbundling of power generation from transmission and distribution on the operating efficiency of state-owned thermal power plants in India. In study of developing countries it has been witnessed that apart from macroeconomic stability, the pace and sequencing of reforms has a strong influence on private investment in the power sector.Paton Celine (2012) has emphasized greater private sector participation and renewable energy development in the context of Moroccan Electricity Industry growth. Due to its advantageous geographic location and relatively low labor costs, Morocco has built close ties with Europe, its main

trading partner. Kintanar Noel Eli B., et.al. (2003) have described how the Government of the Philippines continues to pursue its policy of encouraging the private sector to participate in the financing, construction, management and operation of infrastructure services and facilities in the country. Victor David G. and Thomas C. Heller (2006) evaluates the experiences of five countries– Brazil, China, India, Mexico and South Africa – as they have shifted from state-dominated systems to schemes allowing for a larger private sector role.

Research Gap

On completion of the literature review, it is observed that sector wise classification such as private sector's contribution to power generation in Uttar Pradesh is not very well addressed in view of its potential for significant contribution in changing scenario of power generation and open access to private sector participation. With the given background of lowest per capita power consumption, population increase, infrastructure growth and industrialization, it appears that these factors may influence the growth of power sector in Uttar Pradesh provided the sectoral reforms are proper and adequate for facilitating fuel supply, realization of revenue and reduction in various losses. Besides these, conducive government policy, workforce & political stability and encouragement of market driven mechanism, are few other important influencing factors which pave the growth of private sector participation.

Therefore the Research gap identified for the study is mainly focused on identifying the factors affecting sustainability of private sector participation in power generation. It has also been attempted to determine the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh. Since these factors are greatly influenced by the policies of the Government, therefore it has been an earnest need to assess the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.

Research Methodology

The proposed Research Methodology aims to solve the research problem with extensive use of primary data. However, secondary data is collected to assess the market potential where the probable demand pattern is likely to grow and the factors affecting the same , may it be techno commercial, consumer behavior, regulatory or environmental. The related primary data may be backed up by secondary data from reliable sources and published data from government agencies.

The objective is to analyze the pace of growth of power market in Uttar Pradesh within the limitations of Techno-Commercial aspects in the context of the factors of the neighboring states and within the framework of Indian power sector related policies.

Thus the objectives of the study lie within the frame of the following points.

1) To identify the factors affecting the sustainability of private sector participation in power generation in the geographical region of Uttar Pradesh.

2) To determine the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh.

3) To assess the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.

4) To devise measures by which private sector participation in power generation in Uttar Pradesh could be increased.

5) To determine the probable impact of private sector power generation on consumers in Uttar Pradesh.

1 Hypothesis testing

Based on the objectives and the problem statements test construct and hypothesis were made which were tested with the help of primary data based on the survey questionnaire meant for end consumers of power and the other meant for power generation companies.

2 Type of Research

The study is mainly descriptive and partially exploratory in nature, however extensive use of primary data along with the secondary data processing and opinion poll of customers is incorporated to assess the situation close to practicality.

3 Population/Universe

The population universe is the Power market comprising of six of major cities under discussion. The criteria for selection of samples is based on the secondary source report of CRISIL (Research Outlook 2007-08 to 2011-12: Sector: Power) regarding top 20 major potential cities/districts of Uttar Pradesh. Three each of two groups namely Muzzafarnagar, Kanpur , Agra & Allahabad , Varanasi ,Gorakhpur have been considered for the survey administered personally during Oct 2012 to Nov 2012 taking 60 samples from each city/district totaling 360 samples.

In another survey targeted to get response from the prospective private sector power generation companies of India willing to set up new power projects the sample size was about 25 power generation companies (67 respondents).

4 Sampling procedure

The survey was done through a detailed questionnaire to 'End consumers of power (Electricity) who were contacted at the office of the electricity bill collection center. Another questionnaire was made for responses from the 'Private sector power generating companies' of India who can be prospective companies for setting up of new plants in Uttar Pradesh was administered electronically. Snow ball technique was used for getting the details of various key personnel of private power generation companies which aggregated to 67 respondents from about 25 companies.

5 Questionnaire Development and Administration

Development of research instrument involved identification of constructs, method of survey to be employed, questionnaire design, pretesting of questionnaire and administration of final questionnaire. The broad methodology adopted in developing the survey instrument used in the study is illustrated as following exhibit. The same is followed by a discussion on the steps involved in the design.

6 Measurement Scales

As this study aims to measure consumer perception towards the electric power supply quality, Likert scale was supposed to be the best suited on a five point scale.

Two type of questions were posed to end consumer 1) one Likert scale 2) along with few multiple choice (with open ended options) to assess the market potential. Similar questionnaire was made for survey of power generating companies.

7 Pilot study

The survey of end consumer started off in October 2012 with the selection of group of respondents based on convenience sample which is common for pilot tests (Zikmund, 2002, Boyd et al. 2003) in all 32 questionnaires were distributed to consumers to power to check for clarity of the measurement items. Consumers were asked to complete the questionnaire and also give open ended answers of their in few questions. A total 30 usable responses were obtained and based on the feedbacks of pilot study the questionnaire was slightly revised and reliability was established. The pilot scale study has shown a Chronbach alpha value of 0.82576739 which is quite an acceptable value.

8 Analysis Techniques

The outcome of the Survey Questionnaire based on the hypothesis is being analyzed using Chi Square test & Kruskal Wallis test for the given set of observed frequencies (n) which are subject to (k) independent restrictions (constraints) for an expected growth rate of the market

per year while taking a given level of significance (say 0.05).To test the hypothesis Chi Square (χ^2) has been calculated and if the calculated value is equal to zero, there is perfect agreement between observed and expected frequencies. For a given null hypothesis if the significance value is > 0.05 then null hypothesis is accepted, otherwise it is rejected.

Limitations of the Study

Although efforts were made to carry on research that was theoretically and empirically sound, the study suffers from several limitations:

1. A general lack of reliable independent statistics regarding the satisfaction of end consumer of electricity (power) was observed. In view of the ever continuing monopoly and the sector being a state government entity no substantial secondary source of data was available nor does any survey exist by the service providers.
2. The study is restricted to specific cities of Uttar Pradesh. As only select areas of U.P. were taken from the select potential areas/ cities based on the CRISIL report, the study covers about 60 representative samples from the given places however their market size may vary.
3. The study assumed that the respondents were all individual customers whose individual perception and expectations relating to service quality controlled the decision regarding the available service and not taking into account possible impact of Govt policy or family influence.
4. The identified variables may have been influenced by the interest and the knowledge limitations of the customers, regardless of the attention & effort, and thus may not be considered to be exhaustive. Additionally collecting respondent's data on expectation and perceptions of the availability and quality at the same time could have compromised the reliability of the data.
5. The privatization of power generation is in early stage of growth in Uttar Pradesh and distribution of few areas are being privatized under government policies therefore the study may have got influenced in view of the policies of Government of Uttar Pradesh.

Analysis & Findings

One set of questionnaire was meant for end consumersand theother set of questionnaire was addressed to private sector power generation companies to assess the impact of various factors affecting sustainability, problems & challenges that confront private sector participation, impact of government policies and measures by which private sector participation could be increased. The test construct based on the questionnaire of the power generation companies has been analyzed based on the mean value of the response on Likert scale (1-5). The following factors which affect the sustainability of private sector participation in power, on survey have revealed results as appended.

It is inferred from the table that almost all mean values are higher than 3.5 which indicates that these have got significant impact on the factors affecting sustainability.

Table 1 Analysis of Factors affecting sustainability

Factors affecting sustainability (on Likert scale)	**1**	**2**	**3**	**4**	**5**	**Mean value**
Implementation of Govt. policy	1	1	0	5	9	4.25
Investment cost	1	1	4	4	6	3.81
Fuel Cost	1	1	3	3	8	4.00
Operation cost	0	1	7	3	5	3.75
Maintenance Cost	0	3	7	1	5	3.50
Modernization of transmission & distribution	0	0	3	7	6	4.19
Govt. being single buyer	0	1	1	9	5	4.13
Future demand for electricity (power) due to population growth in U.P.	1	0	3	6	6	4.00
Future demand for electricity (power) due to economic development in U.P.	2	1	2	6	5	3.69
Cost benefit solution through Gas based power projects	2	1	4	4	5	3.56

The following factors which asses the Problems & Challenges that confront private sector participation, on survey have revealed as appended. It is inferred from the table that almost all mean values are higher than 3.5 (except one as discussed below the table) and many of which are having mean value in the range of 4.0 (significant impact) or more than 4.0 (highly significant impact) on the given factors.

Table 2 Analysis of problems & challenges that confront private sector participation

Problems & Challenges that confront private sector participation	**1**	**2**	**3**	**4**	**5**	**Mean value**
Risk of timely payment by distribution companies in U.P.	2	0	0	2	12	4.75
Lack of knowledge & experience by private entrepreneurs	0	6	6	3	1	*2.94*
Land acquisition problems	1	1	1	5	8	4.13
Fuel supply problems	1	1	1	7	6	4.00
Inadequate infrastructure	0	2	0	7	7	4.19
Bias of state regulator against private sector	0	1	2	8	5	4.06
Inefficient transmission & distribution system	0	0	3	7	6	4.19
Inadequate cost recovery	1	0	2	6	7	4.13
Non payment of power generation bill by the Govt. of U.P.	1	1	0	4	10	4.31
Load shedding effect on potential of growth	0	0	4	8	4	4.00
Longer breakeven point (duration)	1	1	2	6	6	3.94
Geopolitical risk in case of coal assets acquired abroad by the power generating company	1	1	2	8	4	3.81
Intervention by NGO's	0	0	6	8	2	3.75

The statement "*Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process*" with *a mean value of 2.94 (less than 3.0) and therefore inferred that it has not been accepted by the private power generating companies concluding thereby that "Private Power generating companies have the competency of their domain and therefore this factor would not hinder the privatization process".*

The following factors which are related to policies of the government, on survey have revealed results as appended. It is inferred from the table that all mean values are higher than 4.0 which indicates that these have got a much higher impact on the given factors.

Table 3 Analysis of aspects related to policies of the Government

Aspects related to Policies of the Government	**1**	**2**	**3**	**4**	**5**	**Mean value**
Financial, Promotional & fiscal incentives	0	1	4	4	7	4.06
Improvement in administration & beaurocratic functioning	0	2	1	3	10	4.31
Simplification of procedure	0	2	3	4	7	4.00
Reduction in Administrative Delays	0	1	3	2	10	4.31
End of License Raj	0	1	2	5	8	4.25
Overall policies of the Govt. of UP	0	1	2	5	8	4.25

The following factors which are related to measures by which pvt sector participation could be increased, on survey have revealed results as appended. It is inferred from the table that for the mean value higher than 3.5 indicates that, by backward integration of fuel supply significant contribution can be done in private sector participation which is a measure by which private sector participation could be increased. It can also be inferred that for the mean values higher that 4 .0 regarding adoption of alternate source of power has a high impact as a measure by which private sector participation could be increased.

Table 4 Analysis of measures by which pvt sector participation could be increased

Measures by which private sector participation could be increased	1	2	3	4	5	Mean value
Backward integration of fuel supply for fuel security	1	2	2	7	4	3.69
Adoption of alternate source of Power generation (wind, solar etc.)	1	1	4	6	4	4.19

The results of the hypothesis testing relating to survey administered to end consumers (other set of questionnaire) are summarized in the following tables.

Table 5 Summary of hypothesis testing H (1)

Null Hypothesis statement	Significance value	Condition	Null Hypothesis
Hypothesis H1 a: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H1 b: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various age groups.	0.154	Significance value is > 0.05	Accepted
Hypothesis H1 c: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various occupation.	0.357	Significance value is > 0.05	Accepted
Hypothesis H1 d: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various income groups.	0.009	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh stands valid by age group and occupation however has varied opinion on the basis of areas/districts and income group.

Table 6 Summary of hypothesis testing H(2)

Hypothesis H2 a: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H2 b: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various age groups.	0.04	Significance value is < 0.05	Rejected
Hypothesis H2 c: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various occupations.	0.394	Significance value is > 0.05	Accepted
Hypothesis H2 d: There is no significant difference in the mean value in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various income groups.	0.002	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh stands valid only by different occupation group, however has varied opinion on the basis of areas/districts, age group and income group.

Table 7 Summary of hypothesis testing H (3)

Hypothesis H3 a: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various areas/districts.	0.123	Significance value is > 0.05	Accepted
Hypothesis H3 b: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various age groups.	0.30	Significance value is > 0.05	Accepted
Hypothesis H3 c: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various occupation.	0.868	Significance value is > 0.05	Accepted
Hypothesis H3 d: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various income groups.	0.255	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts stands valid by all the groups of respondents and do not have any difference of opinion on the basis of areas/districts, age group, occupation and income group.

Table 8 Summary of hypothesis testing H (4)

Hypothesis H4 a: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H4 b: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various age groups.	0.392	Significance value is > 0.05	Accepted
Hypothesis H4 c: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various occupation groups.	0.859	Significance value is > 0.05	Accepted
Hypothesis H4 d: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various income groups.	0.124	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system in Uttar Pradesh, stands valid by occupation, age group and income group however has varied opinion on the basis of areas/districts.

Table 9 Summary of hypothesis testing H (5)

Hypothesis H5 a: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H5 b: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization ,across various age groups.	0.035	Significance value is < 0.05	Rejected
Hypothesis H5 c: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization across various occupation.	0.341	Significance value is > 0.05	Accepted
Hypothesis H5 d: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization , across various income groups.	0.000	Significance value is < 0.05	Rejected

In view of the analysis of results of the above hypothesis on demographic parameters it is observed that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization , stands valid by occupation, however has varied opinion on the basis of areas/districts , age group and income group.

Table 10 Summary of hypothesis testing H (6)

Hypothesis H6a: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various areas/districts.	0.049	Significance value is < 0.05	Rejected
Hypothesis H6b: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option , across various age groups	0.028	Significance value is < 0.05	Rejected
Hypothesis H6c: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various occupations.	0.449	Significance value is > 0.05	Accepted
Hypothesis H 6d:There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various income groups.	0.183	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that that Pricing of power based on price band method for the amount of power consumed (initially subsidized up to a certain level and subsequently on actual market price, non- subsidized mechanism) is a better option stands valid by occupation and income group however has varied opinion on the basis of areas/districts & age group.

Table 11 Summary of hypothesis testing H (7)

Hypothesis H7a: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations , across various areas/districts.	0.000	Significance value is < 0.05	Rejected
Hypothesis H7b: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various age groups.	0.059	Significance value is > 0.05	Accepted
Hypothesis H7c: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various occupations.	0.085	Significance value is > 0.05	Accepted
Hypothesis H7d: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various income groups.	0.250	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations stands valid by occupation, age group and income group however has varied opinion on the basis of areas/districts.

Table 12 Summary of hypothesis testing H(8)

Hypothesis H8a: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various areas/districts .	*0.00*	Significance value is < 0.05	Rejected
Hypothesis H8b: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various age groups .	0.633	Significance value is > 0.05	Accepted
Hypothesis H 8c: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various occupations.	0.378	Significance value is > 0.05	Accepted
Hypothesis H 8d: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various income group.	0.030	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P., stands valid by occupation, age group however has varied opinion on the basis of areas/districts and income group.

Table 13 Summary of hypothesis testing H (9)

Hypothesis H 9a: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various areas/districts.	0.081	Significance value is > 0.05	Accepted
Hypothesis H 9b: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various age groups .	0.421	Significance value is > 0.05	Accepted
Hypothesis H9c: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various occupations.	0.713	Significance value is > 0.05	Accepted
Hypothesis H 9d: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various income groups.	0.877	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies in U.P., stands valid all occupation, age group and income group and areas/districts.

Conclusions

It is inferred that among the factors affectingsustainability the issues of implementation of government policies, modernization of transmission and distribution, adoption of alternate sources and future demand due to population growth are significant.Besides this, investment cost, fuel cost, operation & maintenance cost and modernization of transmission & distribution would have a significant impact on the sustainability of private sector power generation.Following are the conclusions drawn from the abovestudy on various issues.

1 Issues Relating to Power Generation Companies:

a) Related to sustainability of private sector participation in power generation in Uttar Pradesh

From the survey administered to the private sector power generation companies it is inferred that implementation of Govt. policy participation has very significant impact on sustainability of private sector. Though less impacting Investment cost would have significant impact on the sustainability of private sector participation in power generation.

Fuel cost has been considered to be having very significant impact on the sustainability of private sector power generation, the operation & maintenance cost would have also have significant impact on the same. Modernization of transmission & distribution would have as significant impact on the sustainability of private sector power generation as Govt. being single buyer is impacting conversely on the sustainability of private sector power generation.

An increasing trend of population growth in U.P. would more significantly on future demand for Electricity (power) compared to the rising trend of economic growth in U.P. It is also inferred that Private companies have a significant cost benefit if they undertake gas based power projects.

b) Related to problems and challenges that confront private sector participation in power generation in Uttar Pradesh

Risk of timely payment by distribution companies in U.P. would significantly impact privatization has been rated to be very high on the Likert scale (4.75) which seems to be the biggest problem among all problem and challenges . Whereas land acquisition problems, fuel supply problems, inadequate infrastructure & inadequate cost recovery are the few factors which would significantly hinder the privatization process it is inferred that lack of knowledge and experience by private entrepreneurs would not significantly hinder the privatization process.

. The statement "*Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process*" has*a mean value of 2.94 (less than 3.0) and therefore inferred that it has not been accepted by the private power generating companies and concluding thereby "Private Power generating companies have the competency of their domain and therefore this factor would not hinder the privatization process".*

Inefficient transmission and distribution capacity & nonpayment of power generation bill would significantly hinder the privatization process. Bias of state regulators for public sector corporations or against private sector companies & load shedding would seem to be equally and significantly impacting the privatization process the potential and growth of private sector power companies. Geopolitical risk in case of coal asset acquired abroad and the intervention by NGO s would also have significant impact on privatization process.

c) Related to role and impact of Government policies relating to private sector participation in power generation in Uttar Pradesh

The following factors have been observed to be very significant which are related to the role and impact of government policies (all have mean value at least 4.0 or above).

Financial promotional and fiscal incentives, improvement in administrative & beaurocratic functioning, simplification of procedure, reduction in administrative delays, improvement in overall policies of the Government and end of License Raj regime.

d) Related to measures by which private sector participation in power generation can be improved in Uttar Pradesh

It has been observed that two major factors which have importance in improving the private sector participation have been considered to be significant are backward integration of fuel supply which would have significant impact on fuel security and prospects relating to producing electricity through renewable energy by private companies.

2 Issues Relating to End Consumers: The exclusive survey of end consumer(s) has concluded that

a) For the hypothesis that Market driven (non -subsidized) price mechanism can improve the availability and reliability of power in U.P. when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by all age groups & occupation however there was varied opinion on the basis of areas/districts & income groups .

b) The hypothesis based on the statement that Immediate privatization of power generation and distribution would improve power generation & distribution of power supply in U.P. when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by all occupation however there was varied opinion on the basis of areas/districts, income groups and age groups.

c) For the hypothesis based on the statement that Large size plants/capacity addition of power plants will have negative environmental impacts when analyzed on the demographic parameters revealed that based on the mean value was very well accepted and stands valid by all age groups , occupation , areas/districts & income groups .This also reveals that there is a general awareness among people of all groups on such vital issue of environmental concern.

d) For the hypothesis based on the statement that, with high capital investment there is a likely of increase tariff in open market of power generation when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation, income groups and age groups however there was varied opinion on the basis of areas/districts.

e) For the hypothesis based on the statement that Privatization would not have any effect on subsidies provided for household consumers when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation however there was varied opinion on the basis of income groups areas/districts and age groups.

f) For the hypothesis based on the statement that Privatization would result on pricing of power based on price band method for the amount of power consumed initially subsidized upto a certain level and subsequently on actual market price (non - subsidized) mechanism when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation & income groups however there was varied opinion on the basis of areas/districts and age groups.

g) For the hypothesis based on the statement that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation, income groups and age groups however there was varied opinion on the basis of areas/districts.

h) For the hypothesis based on the statement that Privatization for transmission / distribution followed by before privatization of power generation in Uttar Pradesh would be beneficial for consumers when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation & age groups however there was varied opinion on the basis of areas/districts and income groups.

i) For the hypothesis based on the statement that Privatization would have the impact of reducing power deficit through the addition of power generation capacity by private companies when analyzed on the demographic parameters revealed that based on the mean value it was very well accepted and stands valid by all age groups , occupation , areas/districts & income groups.

Recommendations

Many assume that reforms will cut costs and lead to lower tariffs which is not the case in reality. In fact, the fundamentals are different at conclusion in the industry point of view and opposite to the general perception . In view of the tariff fixation the policy would be required to support market driven price mechanism which may not be acceptable to the end consumers in large, however a middle way of moving ahead in this direction can be the implementation of tariff plans as per price band method which is a more practical approach in moving towards the market driven price mechanism.The following are the recommendations of the above study.

1) Related to Problems & Challenges that confront Private Sector Participation

Among the problems and challenges being faced are issues of risk of timely payment by distribution companies, infrastructure problem, inefficient transmission & distribution system and land acquisition problem. In the survey administered to the private sector power generation companies the issue of timely payment has been observed to be the most significant factor that impacts private sector participation. In view of this, it is recommended that the Government of Uttar Pradesh may take up such reform process which ensures timely payment by distribution companies. In the other survey administered to the end consumers it has been observed that the hypothesis which relates to the privatization of transmission and distribution (even before that of generation) has been supported by various age group and occupation (though have varied opinion on the basis of area and income group). Fuel supply problem has also been considered significant among such issues. Bias of state regulator against private sector, land acquisition problems, inadequate cost recovery, nonpayment of power generation bill and load shedding are other such important issue which needs to be addressed by the Government of Uttar Pradesh immediately in order to have successful reform process and to remain attractive for future investments by private sector companies. It may be noted that the private sector power producers do not significantly acknowledge the lack of knowledge & experience by private entrepreneurs which shows high confidence that the private producers can efficiently manage new power projects. Therefore the following factors should be immediately addressed by the Government of Uttar Pradesh in view of the problems and challenges being faced by power

generation companies to pave the way for their investment in power generation projects in Uttar Pradesh.

a) Timely payment by distribution companies
b) Ensuring ways and means of adequate cost recovery
c) Addressing land acquisition problems
d) Improving Infrastructure and modernization of Transmission and distribution
e) Ensuring unbiased state regulator for power sector

2) Related to Policies of the Government (Reform process)

There has been a large variation in the performance of the states and reforms alone do not indicate success in terms of loss reduction or efficiency. This variation was observed due to the fact that some states were choosing to privatize distribution, some simply unbundling the SEBs, and others keeping the SEBs intact while adopting organizational reforms aimed at improving economic efficiency. The main factor in explaining outcomes is the ability of the state governments to implement reform (or operational improvement) plans and the strength of their institutions. Governments with weak institutions have performed poorly even when they had ambitious reform plans, as in Orissa. Governments with strong institutions and sustained commitment to reform (e.g., Andhra Pradesh and subsequently Delhi) have fared much better.
It is therefore required that following areas must be improved by the Government of Uttar Pradesh to encourage private sector participation and make the power sector viable and efficient.

a) Simplification of procedures
b) Reduction in administrative delays and decision making
c) Elimination of multiplicity of clearance
d) Recovery of revenue
e) Other aspects of the reform process which need to be in place concurrently and consistently
f) Restructuring of legal issues should be well before in place.

3) Related to Factors Affecting Sustainability

In the survey administered to the end consumers of power the hypothesis 'Market driven (non-subsidized) price mechanism can be the option to improve upon the availability and reliability of power in U.P.' was accepted by all age group and occupation, however had varied opinion on the basis of area and income group. When considered on the basis of price band method (initially subsidized upto a certain units and subsequently on market price mechanism) , the statement was in agreement with various occupation and income group. It was also understood that for the hypothesis relating to privatization of transmission & distribution to be done before that of generation was in agreement with various age group and occupation however has varied opinion on the basis of area and income group. In the same survey the hypothesis relating to rise in tariff under open market (non subsidized pricing) system due to high capital investment was acknowledged by all occupation, age group and income group however had varied opinion on the basis of area/districts.

Environmental considerations have not played a major part of Indian reforms, although the net effect of reforms has probably been positive for the environment. In response to the survey administered to the power generation companies it has emerged as one of the significant aspects of sustainability if the private power generation companies take up the gas based power plants. Also in the survey administered to the end consumer all the respondents have considered this aspect as an environmental consideration. It is recommended that all potential private sector players must ensure their fuel security by having own assets or long term agreements with suppliers to ensure fuel security and remain competitive in the market.

The problems related to power sector which needs to be addressed immediately, especially with respect to sustainability and generation deficit are

a) Economically viable price mechanism
b) Issue of subsidy
c) Cost of supply versus realization,
d) Remedial for utilities which are bleeding money
e) Wasteful consumption in irrigation and
f) Capacity addition to overcome power deficit.

In view of the above study it is inferred that large potential exists across the state of Uttar Pradesh which is in want of energy so as to cope up with the increase in population growth and industrial growth as has also emerged in the survey administered. Policy changes as are being notified by the Government of Uttar Pradesh from time to time which are welcome move and are the need of the hour.

4) Related to Measures by which Private Sector Participation could be increased

It was found through the survey that inadequate infrastructure and a lack of governance and transparency were the major obstacles to investment in power sector. The report concludes that by improving upon these obstacles will result in an improvement in India's attractiveness for investment. The Government, though sensitive to the challenges, has to hasten policy-making and implementation, so that India continues to remain attractive. Kintanar Noel Eli B., et.al. (2003) have described how the Government of the Philippines continues to pursue its policy of encouraging the private sector to participate in the financing, construction, management and operation of infrastructure services and facilities in the country. Besides key factor as discussed above the following are some important measures by which private sector participation can be increased.

a) Tariff structure revision with
b) Link to market driven price mechanism
c) Mode of participation such as BOOT concept

5) Mode of Private Sector Participation

It is also understood from the study that private sector participation would lead to better competition among the private players and public sector utilities would also be forced for adoption of such management to remain competitive. The concept of BOOT can work very well as these have been well experienced in other infrastructure sector. It is also advisable to the power sector players to have their fuel linkages and fuel security plans in place before entering in power generation sector. Also the fuel opted would have their environmental concerns which needs to be separately addressed in view of MoEF guidelines. From the response of private sector power generating companies, it has also been inferred that

a) Best Public - Private Partnership in case of a joint venture is 49-51 % which mean for such participation between public and private partnership the management control has to be in the hands of private sector.

b) As regards the Equity participation between foreign & Indian company in power generation there are varied opinion on the composition of equity participation however it has been observed that 30-70% and 49-51 % composition has been preferred by private sector power generators.

c) For the alternative mode of Private Sector of participation BOOT concept has been widely agreed.

Directions for Future Research

Based on the above research, following directionshave been pointed out for future research

1. Future researchers may expand the scope of study to other geographical region of India or other Indian states or other region of the world where it may deem suitable and worthy to conduct the research work.
2. Further research may be carried to explore other / additional important factors or decision making variables.
3. The present private sector power generation is in nascent stage in various Indian states, with the upcoming technology and globalization it may happen easily that private power producers may take competitive advantage and thereby bringing the private sector participation to a greater extent which may be studies in further research. Bringing the cost of power to lower side is presently not viable in the current scenario however with the advent of new technologies it may happen in future. In view of that various other issues relating to private sector participation may crop up.
4. Future research may treat this as a service industry wherein multiple service providers may be available and accordingly the service quality may also be studied for various regions or private power generation companies.

PROBLEMS AND PROSPECTS OF PRIVATE SECTOR PARTICIPATION IN POWER GENERATION IN UTTAR PRADESH

THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

Ph. D. (BUSINESS ADMINISTRATION)

BY

ASHEESH SRIVASTAVA

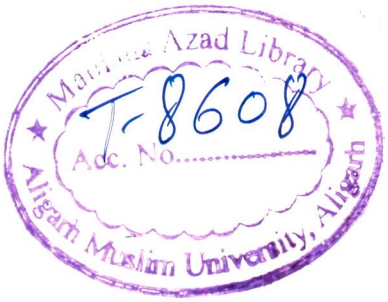
UNDER THE SUPERVISION OF

Dr. Mohd. Afaq Khan
Assistant Professor
Dept. of Business Administration
Faculty of Mgmt. Studies & Research
Aligarh Muslim University, Aligarh
(Internal Advisor)

Prof. R. C. Katiyar
Former Director & Dean
Institute of Business Management
CSJM University, Kanpur
(External Advisor)

DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF MANAGEMENT STUDIES & RESEARCH
ALIGARH MUSLIM UNIVERSITY
ALIGARH - 202002 [INDIA]

2013



22 OCT 2014

T8608

Dedicated to the memory of my beloved parents

Late Sh. S.P. Srivastava

&

Late Smt. Prem Lata Srivastava

My eternal source of inspiration

Dr. Mohd. Afaq Khan
Assistant Professor

Department of Business Administration
Aligarh Muslim University, Aligarh
Phone: 2702044, 3580 (Ext)

July 15, 2013

CERTIFICATE

This is to certify that the thesis titled **"Problems and Prospects of Private Sector Participation in Power Generation in Uttar Pradesh",** submitted to the Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh for the award of the degree of **Ph.D. (Business Administration)** is a record of original work done by **Mr. Asheesh Srivastava** during the period of his study in the Department of Business Administration, Faculty of Management Studies and Research, under my supervision and guidance.

This thesis has not formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title to any candidate of any university.

Dr. Mohd. Afaq Khan
Supervisor

INSTITUTE OF BUSINESS MANAGEMENT
C.S.J.M. UNIVERSITY (FORMERLY KANPUR UNIVERSITY), KANPUR - 208 024

CERTIFICATE

This is to certify that the thesis titled **"Problems & Prospects of Private Sector Participation in Power Generation in Uttar Pradesh"** submitted to the Department of Business Administration, Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh is a record of original research work done by **Mr. Asheesh Srivastava** for the award of Ph.D. (Business Administration) during the period of the studies with the Department of Business Administration, Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh under my guidance and the thesis has not formed the basis for the award of any Degree/ Diploma/Associateship/Fellowship or other similar title to any candidate of any University/Institution.

Place: Kanpur

Date : 15.07.2013

(Prof. R.C. Katiyar)
M.Com.,Ph.D.,FCMA, D.Lit.
Professor of Business Administration
Former Director, Head & Dean
Institute of Business Management
C.S.J.M. University, Kanpur-208024 (U.P.)
(Formerly Kanpur University, Kanpur)

Phone : 0512-2571588 • Fax: 0512-2570006 • E-mail : ibmcsjmu@yahoo.com • Visit us at : www.kanpuruniversity.org

Declaration

I hereby declare that the thesis titled "Problems & Prospects of Private Sector Participation in Power generation in Uttar Pradesh" submitted to the faculty of Management Studies and Research , Aligarh Muslim University , Aligarh for the award of the degree of Ph. D. in Business Administration is a record of original work done by me , under the supervision and guidance of Dr. Mohammad Afaq Khan , Assistant Professor , Aligarh Muslim University Aligarh (Internal Advisor) and Prof R.C. Katiyar , Head and Dean , Institute of Business Management , Kanpur University Kanpur (External Advisor) and it has not formed the basis for award of any Degree/Diploma/Associateship/ Fellowship or similar title to any candidate of any university in India or Abroad.

Asheesh 14.7.2013

Asheesh Srivastava
Research Scholar
Enrolment No GD-6122
Department of Business Administration
Faculty of Management Studies & Research
Aligarh Muslim University, Aligarh

Acknowledgements

In the name of the Almighty God

I wish to convey my deep gratitude to Dr. Mohammad Afaq Khan , Assistant Professor , Aligarh Muslim University Aligarh (Internal Advisor) and Prof R.C. Katiyar , Former Director and Dean , Institute of Business Management , CSJM University Kanpur (External Advisor) for their expert professional guidance at all the times throughout the study, to make it complete with logical conclusions.

I am also indebted to Prof M. Khalid Azam, Dean, Faculty of Management Studies & Research Aligarh Muslim University, Aligarh for his continuous support , guidance and motivation. I wish to thank Dr. Nikhil Mehta , Assistant Professor (NITIE Mumbai) , Dr. Mohammad Naved Khan, Associate Professor , Dr. Asif Akhtar , Assistant Professor, Dr. Asad Rahman , Assistant Professor & Mr Mohd. Faisal , Research Scholar , Faculty of Management Studies & Research , AMU Aligarh for their valuable guidance and support from time to time during the course of study.

I am thankful to Aligarh Muslim University, All India Management association (AIMA) New Delhi, National Institute of Training and Industrial Engineering (NITIE) Mumbai for permitting me to use their library facility and to the Management of GAIL (India) Ltd. New Delhi, for the permissions required to carry out the doctoral work.

My sincere thanks are also due, to my father- in- law, Dr. Prakash Chandra Srivastava (Rtd. Reader) , mother-in- law , Smt. Sheela Srivatava (Principal) for their parental encouragement. My thanks are also due to my wife Dr. Shraddha Srivastava for her encouragement, support and sacrifice to make my dream a success. Lots of little thanks to my children Arushi & Ashee, who could not get my time for quite long and were very keen to see me studying and completing my study.

At last I wish to pay my sincere thanks to the survey respondents and all other individuals who provided their help and guided me during the course of my research work.

Asheesh

Asheesh Srivastava

Preface

India represents an attractive destination for the power industry because of being one of the fastest growing economies and the second largest populated country. With the proper enactment of several policies there has been a phenomenal growth in capacity addition in the last few years and in the coming future the trend is likely to continue. Reforms such as, the Electricity Act and National Electricity Policy will provide the necessary stimulus to the Indian power sector to move ahead.

In order to properly address the demand-supply gap the effective solution lies in tapping the underlying potential and adding further capacities, thus the states are complementing the efforts made by the central government for achieving the targets. The states are making targets for capacity additions and formulating strategies in co-operation with central and private players to ensure that the power deficits can be reduced and the very objective of power to all can be achieved. The states are also focusing on those aspects of energy, in which they have an edge, such as solar power, wind power or hydro power.

The work is an attempt to effectively analyze the Indian power sector in the perspective of private sector participation in power generation in Uttar Pradesh, by focusing on key aspects relating to private sector participation in power generation. The work is also an attempt to make the study in view of the impacts of reforms done in other countries and within India in other states since the area of study on primary focus is taken as Uttar Pradesh.

When India became independent in 1947, the country had a power generating capacity of 1,362 MW. Generation and distribution of electrical power was carried out primarily by private utility companies. Power was available only in a few urban centers; rural areas and villages did not have electricity.

After 1947, all new power generation, transmission and distribution in the rural sector and the urban centers (which was not served by private utilities) came under the purview of State and Central government agencies and thus the State Electricity Boards (SEBs) were formed in all the states.

National Thermal Power Corporation (NTPC), National Hydro-electric Power Corporation (NHPC) and Power Grid Corporation Limited (PGCL) were formed by the government to assist in meeting the increasing demand for electricity throughout the country. Both the State and Central governments participated in the sector's development. The Ministry of Power in the Central government formulates the policies for the power sector and the Central Electricity Authority (CEA) was established as a statutory authority to function as an aid for Technical approval of projects and also to act as a regulatory authority. As per government guidelines, all power projects above a certain capacity have to obtain techno-economic clearance from CEA before they can be implemented. A new Ministry of Non-Conventional Energy Sources has also been formed to focus on renewable energy sources to augment the generation capacity of electrical power.

The policy of liberalization the Government of India was announced in 1991 and consequent amendments in Electricity (Supply) Act have opened new vistas to involve private efforts and investments in electricity industry. Considerable emphasis has been placed on attracting private investment and major policy changes have been announced by the Government in this regard from time to time.

In Chapter -1 power sector of India has been introduced, describing the Indian scenario, Global Scenario and the Scenario of Uttar Pradesh. Cost of power generation, role of private players, various reforms undertaken by different states, global scenario and power generation scenario of Uttar Pradesh has been discussed elaborately.

Chapter- 2 is the survey of literature wherein the need of private sector participation in power generation, drivers of private sector participation in power generation , sustainability of private sector power projects , availability of resources for capacity addition and privatization in various developed and developing countries have been discussed. Based on the extensive literature review capturing these points the research gap has been established.

Chapter-3 describes the research methodology wherein based on the research gap and the statement of problem the research objectives have been identified. Further based on these objectives hypothesis have been framed. The chapter describes on the scope of study, type of research, population/universe taken and the sampling procedure

adopted. The chapter further details the steps of questionnaire development, selection of survey method, administration of final questionnaire and the analysis techniques applied. At the end of the chapter it includes the limitations of the study under the given conditions.

Chapter-4 exhaustively describes the analysis & findings, based on the of the outcome of the survey using suitable statistical techniques such as Chi Square test and ANOVA. Hypothesis testing has been done on the outcome of the survey administered to the end consumers of power. The other set of survey administered to private sector power generation companies have been analyzed to draw apt inferences.

Chapter-5 completes the study with conclusions drawn from the analysis and literature review, incorporating suitable recommendations for these findings and suggesting directions for future research.

TABLE OF CONTENTS		
Chapter	**Particulars**	**Page No**
Chapter-1	**Introduction**	**1-58**
1.1	Cost of Power Generation	4
1.2	Power generation Scenario of India	13
1.3	Capacity addition: Role of private sector players	25
1.4	Reforms undertaken by different states	31
1.5	Global Scenario of power generation	36
1.6	Power generation scenario in Uttar Pradesh	42
Chapter-2	**Survey of Literature**	**59-87**
2.1	Need of private sector participation in power generation	60
2.2	Drivers of private sector participation in power generation	66
2.3	Sustainability of private sector power projects	71
2.4	Availability of resources for capacity addition	78
2.5	Privatization in various developed & developing countries	82
2.6	Research Gap	87
Chapter-3	**Research Methodology**	**88-111**
3.1	Statement of problem	89
3.2	Research Objectives	90
3.3	Scope of study	91
3.4	Testing of survey questionnaire & Hypothesis testing	92
3.5	Type of Research	99
3.6	Population/Universe	101
3.7	Sampling procedure	101
3.8	Questionnaire development	102
3.9	Selection of Survey method	104
3.10	Administration of final questionnaire	108
3.11	Analysis Techniques	109
3.12	Limitations of the study	111
Chapter-4	**Analysis & Findings**	**112-163**
Chapter-5	**Conclusions, Recommendations & Direction for Future Research**	**164-177**
5.1	Conclusions	165
5.2	Recommendations	169
5.3	Direction for Future Research	177
Bibliography		178
Appendices		192
a. Research Questionnaire for power generation companies		
b. Research Questionnaire for end consumers		
c. Summary & Analysis of the data from power generation companies		
d. Research Questionnaire for end consumers (Hindi Version)		

Abbreviations	
ADB	Asian Development Bank
APDRP	Accelerated Power Development and Reform Program
BHEL	Bharat Heavy Electricals Ltd
BOOT	Build, Own, Operate, Transfer
BTG	Boiler Turbine Generator
CCPP	Combined Cycle Power Plant
CERC	Central Electricity Regulatory Commission
CII	Confederation of Indian Industry
CTU	Central Transmission Utility
DoE	Department of Energy
EACs	Expert Appraisal Committees
EIA	Environmental Impact Assessment
EMP	Environment Management Plant
EPC	Engineering, Procurement and Construction
FERC	Federal Electricity Regulatory Commission
FICCI	Federation of Indian Chambers of Commerce & Industry
GDP	Gross Domestic Product
GSDP	Gross State Domestic Product
GW	Giga Watt
IOUs	Investor Owned Utilities
IPP	Independent Power Producers
ICB	International Competitive Bidding
O&M	Operation and Maintenance
PFC	Power Finance Corporation
PFR	Project Feasibility Report
PLF	Plant Load Factor
PPA	Power Purchase Agreement
SEB	State Electricity Board
SHP	Small Hydropower Project
SHR	Station Heat Rate
T&D	Transmission and Distribution
UI	Unscheduled Interchange
UPSEB	Uttar Pradesh State Electricity Board

Chapter-1
Introduction

Power Sector in India is at a crucial juncture of its evolution from a controlled environment to a competitive, market driven regime which endeavors to provide affordable, reliable and quality power at reasonable prices to all sectors of the economy. The Gross Domestic Product (GDP) of our country has been growing at the rate of about 8% for the last several years. The liberalization and globalization of the economy is leading to an increased pace in industrial and commercial activities and this, coupled with penetration of new technologies and Information Technology in the day-to-day life of the common man, is expected to result in a high growth in power demand. It is accordingly essential that development of the Power Sector should commensurate with the overall economic growth of the nation.

The power sector has been at the forefront of reforms in basic infrastructure of the country. In 1991 for the first time, the Government of India announced the decision to allow private investments in infrastructure by opening the power sector to such investments. The primary objective of initiating reforms in the power sector was to mobilize private investment for its development, government having concluded that it did not have sufficient funds to develop the sector itself. Being a highly regulated sector, not surprisingly policies and regulations are playing a pivotal role in the development of this sector. Over the years, the government has realized the importance of the private sector participation.

The Electricity Laws (Amendment) Act was enacted in 1998. For the first time, transmission was recognized as an activity distinct from generation and distribution, under the Law. Further, a Central Transmission Utility (CTU) was created to facilitate power flows from different sources and across various jurisdictions. This would also contribute towards the eventual creation of competitive power markets. Legislation was also passed in 1998 to create independent regulatory agencies at the Central government level and in the states of India. A regulator at the center and in most states has since been set up and is functioning and many have already issued tariff orders. Regulators have contributed to

distancing government from the markets, and improving investor confidence about a level playing field for all sector participants.

An omnibus Electricity Act became operational in 2003, which harmonized various pre-existing laws. The act has strengthened anti-power theft provisions, which is expected to help in reducing power leakages. Under another important provision, the act recognizes power trading as a distinct activity and provides private power suppliers open accesses to transmission and distribution (T&D) networks enabling them to deliver power directly to their customers. The act also de-licensed generation activity except that based on hydro and nuclear resources.

The Electricity Act, 2003 was a turning point in the reforms process which removed the need for license for generation projects, encouraged competition through international competitive bidding, identified transmission as a separate activity and invited a wider public and private sector participation among other things. Some of the other major reforms that have been implemented over the years include: unbundling of State Electricity Boards (SEBs), tax benefits, Accelerated Power Development and Reform Program (APDRP) for distribution, permission for trading of power.

The Electricity Act 2003 has further liberalized the power sector by providing 'open accesses' to private power producers and traders to transmission-distribution networks and enabling them to supply power directly to their customers. It can be argued that with such development, private investors would not need to sell power to SEBs, as they can sell power directly to industrial and commercial customers who are able to pay for it. It is now to be thought of whether the encouragement to private investors to commit large amounts of investments in the power sector is sustainable. It is possible that few modest sized investments may be attracted under such conditions. In this perspective it appears unlikely that major investments would be committed by private investors when the sustainability of the power sector as a whole is far from assured. This is so because the issue of inadequate cost recovery from subsidized consumers would remain unaddressed.

The National Electricity Policy (2005) is one of the key instruments for providing policy guidance to the Electricity Regulatory Commissions in discharge of their functions

and to the Central Electricity Authority for preparation of the National Electricity Plan. The Policy aims at accelerated development of the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view availability of energy resources, technology available to exploit these resources, economics of generation using different resources, and energy security issues.

The Power Sector is endeavoring to meet the challenge of providing adequate power needed to fuel the growing economy of the country. However, this growth of the Power Sector has to be within the realms of the principles of sustainable development. A low carbon growth strategy has been adopted in the planning process and highest priority is accorded to development of generation, based on renewable energy sources. Thrust is also accorded to maximizing efficiency in the entire electricity chain, which has the duel advantage of conserving scarce resources and minimizing the effect on the environment.

Power generation costs are the key to determining the best generation mix for a reliable supply of electricity while making it available for use economically. With an increasing demand for power for economic development, countries around the world need to evaluate the present and future costs of generating electricity using the presently available and expected power generation technologies of future. Evaluating the cost of power generation depends on various factors that are responsible for driving the prices of electricity. The most important factors driving the power generation costs are government policies and incentives, capital (investment cost), fuel costs, operations and maintenance.

1.1. Cost of Power generation

The cost of power generation varies, depending on the type of fuel used. The choice of fuel for a power plant is influenced by several factors such as the relative cost of generation, availability, transportation constraints, and environmental hurdles. The capital costs of power plants also vary significantly, based on the source of energy, infrastructure, plant size, technology and equipment and interest costs incurred during construction.

A power regeneration project has a three-part tariff structure. First, the fixed part of the tariff comprises the interest on long term debt, interest on working capital,

depreciation, operation and maintenance (O&M) expenses (including insurance expenses), return on equity, incentive return on equity, and taxes. Second, the variable part of the tariff comprises the cost of both primary fuel and secondary fuel. The tariff for power generation includes an unscheduled interchange (UI) charge, to account for the variation between actual generation and scheduled generation. The overall generation tariffs change significantly, in line with changes in factor; such as the debt-equity ratio , rate of incentive, Plant Load Factor (PLF) and exchange rate.

The capital costs of transmission lines vary, depending on the configuration of the line, preliminary costs, type of terrain the number of sub-stations, cost of towers and interest costs incurred during construction. Transmission tariffs are based on components such as interest on long-term debt, interest on working capital, depreciation charges, O&M expenses, return on equity and taxes.

1.1.1 Fuels

There are three major options for generating electricity: thermal, hydroelectric and nuclear. Thermal plants can be based either on coal or on natural gas, including liquefied natural gas (LNG)). In India, naphtha is also used a fuel for thermal power plants (in most countries, naphtha is not used as a fuel for generating power, due to its more economical application in the production of fertilizers and petrochemicals). Power plants can also be based on other hydrocarbon fuels like fuel oil and diesel. However, such plants are few in number, smaller in size and are primarily used for captive power generation.

The demand for power varies with the time of the day and the season. A part of the demand is always present (base load), while the balance fluctuates with the time of the day (peaking demand). The choice of fuel for a power plant depends on the type of demand that the plant is expected to meet. In general, power plants with the lowest variable costs (fuel costs) should be employed to meet the base demand, while those with a higher variable cost should be employed to meet the peaking demand. This will result in a minimum overall variable cost of power.

Coal based power plants have lower variable costs than those based on naphtha or natural gas. However, coal-based power plants have high capital costs, which result in

high fixed costs. In addition, these plants cannot vary their output with variation in demand. Hence, coal-based plants are largely used to meet base demand. This results in lower fixed costs per unit, due to higher PLF.

Gas and naphtha based plants have higher variable costs and are more flexible in terms of varying their output. Hence, these plants are better suited for meeting peak demand.

Hydroelectric plants have very low variable costs of generation and are the most flexible in terms of varying output. However, the total amount of energy that hydroelectric plants can produce is dependent on the rainfall. Hence, hydroelectric plants are used exclusively to meet peaking demand.

Nuclear power plants have the highest capital costs and the lowest variable (fuel) costs. Hence, these plants are ideal for meeting base-load demand.

1.1.2 Delivery cost

The delivered price of any fuel can vary significantly depending on the source of supply (imported or indigenous), and the distance of the plant from the source of supply. In India, coal is generally transported from mines to power plants through the railways. However, the high cost of transportation results in a significant increase in per unit cost of coal. As a result, power plants located near coal mines (pit-head plants) are able to generate power at a fairly lower rate than plants that need to transport coal over long distances.

Although India has abundant coal reserves, they are of poor quality. Indian coal has an average calorific value of around 3,500 kcal per kg and an ash content of around 40 per cent, as compared to imported coal which has a calorific value of around 6,500 kcal per kg and an ash content of around 10 per cent. The lower ash content of imported coal results in marginally better operational efficiency and lower ash disposal costs partially compensate for its higher cost.

1.1.3 Supply Reliability

An assured and reliable supply of fuel is critical for a power plant to function as a base load station; an interruption in fuel supply can lower the plant's PLF, resulting in a higher overall cost of power. In coal based plants, operating at a PLF of less than 70 per cent, boilers have to be put on oil support (for stabilizing the flame in the boiler), which results in an increase in the average variable cost of generation.

In India, fuel supply to power plants has been unreliable, due to inadequate transportation infrastructure. Low fuel supply is one of the reasons for the relatively low PLF of Indian coal-based power plants (at around 78 per cent in 2007-08), as compared to that in developed countries. The supply of gas, for gas-based power plants, has also been constrained due to its low availability and the lack of adequate pipeline infrastructure.

Taking into consideration the fuel supply constraints faced by existing power plants, banks and financial institutions insist on a regular fuel supply arrangement (FSA) before funding private sector power projects especially those proposed to be funded on a non-recourse basis. As a result, private power producers want to have legally enforceable fuel supply agreements with fuel suppliers (Coal India Ltd and Petroleum companies) and fuel transporters (such as railways) with provisions for liquidated damages for the non-supply of fuel. Under such an agreement, the power producer would pay a premium on the price of the fuel, to ensure its adequate and regular supply and would also guarantee a minimum off take of fuel from the fuel supplier.

1.1.4 Impact of Technology and equipment

Equipment costs account for around 75-80 per cent of the overall total cost of a thermal plant. However, depending on the choice of technology and equipment, the capital cost of two projects of the same size and using the same fuel can be different. For instance, a power plant based on imported coal requires a smaller boiler than that based on domestic coal. This is due to the higher calorific value of imported coal, which results in lower consumption of coal for per unit of electricity generated. Similarly, lignite-based power plants require larger boilers, as the calorific value of lignite is lower than that of coal.

Power plants based near urban areas or in ecologically sensitive regions would have higher capital costs, due to the stringent design conditions imposed on the equipment in terms of thermal efficiency and emission standards, resulting in the need for additional pollution control equipment.

In addition, if a coal-based power plant includes a captive coal washery, it could increase capital costs. However, the use of washed coal results in a reduction in transportation costs (as washing reduces the ash content of the coal) and ash- disposal costs. In addition, it results in savings in investments on setting up an ash-handling plant and pollution control equipment.

1.1.5 Engineering, procurement and construction (EPC) contracts

The setting up of a power project involves coordination with many suppliers. In order to ensure the timely execution of the project, the services of an Engineering, Procurement and Construction (EPC) contractor are generally employed. The EPC contractor undertakes the turnkey execution of the project on a fixed time and fixed price basis, while guaranteeing the performance of the power plant in accordance with the specifications stipulated by the developer. The value of the EPC contract usually accounts for 80-85 per cent of the total project cost which mainly includes the equipment cost plus the cost of services of EPC contractor. In general, power plants executed on the basis of an EPC contract cost higher.

1.1.6 Rehabilitation and resettlement costs

Thermal power plants require less rehabilitation and resettlement cost because of being compact. Hydroelectric power plants however involve significant rehabilitation and resettlement costs, as they require a huge land surface area. Also, if they have water storage facility, that is, a dam along with the hydroelectric power plant, then costs will be incurred on the rehabilitation and resettlement of people living in the area that will be submerged when the project is completed.

1.1.7 Tariff computation of alternate fuels

This section illustrates the methodology for computing the tariff of a typical power project on the basis of the norms laid down in the two-part tariff policy. Certain assumptions have been made on the basis of examples. The methodology and the assumptions have been detailed below.

The payment due to the generation company by the buyer in any year is computed as follows:

Total payment due = Fixed charges + Variable charges + UI (Unscheduled Interchange) charges

a) Fixed charges comprise,
   i. Interest on long-term debt
   ii. Depreciation
   iii.O&M expenses (including insurance expenses)
   iv. Return on equity
   v. Incentive return on equity
   vi. Interest on working capital
   vii. Taxes

b) Variable charges comprise
   i. Cost of primary fuel
   ii. Cost of secondary fuel

c) Unscheduled interchange charges (UI)

1.1.7.1 Interest on long-term debt: A debt-equity ratio of 2.33:1 is normally assumed. This is also the norm (mandated by the published Tariff Policy in January 2006) by the Government of India. This is the most common norm followed by Indian financial institutions for funding private sector power projects. Further, a break-up of the loan component into domestic debt and foreign debt has been assumed. Representative interest rates have been assumed for rupee and foreign currency debts.

The repayment period is assumed to be 12 years after the commencement of commercial operations by the power project. The interest and the principal is assumed to be payable on a quarterly basis. A 2-year moratorium after the commencement of commercial operations for the repayment of the principal has been assumed.

1.1.7.2 Interest on working capital: Working capital for a coal based / lignite-fired generating station has been calculated on the following basis:

Fuel inventory is assumed at one and half months for pithead generating stations and 2 months for non-pithead generating stations, corresponding to target availability.
Fuel oil inventory is assumed at 2 months corresponding to the target availability. O&M expenses are assumed for 1 month.

Receivables are assumed at 2 months of fixed and variable charges for sale of electricity calculated on target availability .Maintenance spares at the rate of 1 per cent of the historical cost escalated at the rate of 6 per cent per annum from the date of commercial operation.

Working capital has been assumed to be on a normative basis and the rate of interest applicable will be the short-term prime lending rate of the State Bank of India. A bank finance of 75 per cent of the gross working capital requirement has been assumed (a 25 per cent working capital margin has been assumed).

1.1.7.3 Depreciation charges: Depreciation is assumed to be allowed over the 'fair life of the assets' at the rate notified by Central Electricity Regulatory Commission (CERC). In addition, advance against depreciation under CERC norms has been assumed to be allowed to meet debt service obligations by considering the repayment period of loan as 10 years. While determining the advance against depreciation, cumulative depreciation recovered shall also be compared with the cumulative loan repayments made.

1.1.7.4. O& M charges: O & M charges make a significant impact of the total cost of power generation. In view of the type of equipment such as indigenous or imported the O & M costs may vary. However for the purpose of estimation this has been taken at a fixed percentage of the capital cost.

1.1.7.5 Other factors influencing tariff computation

a) **Return on equity:** The return on equity has been calculated on the original equity of the project, at the rate of 14 per cent per annum on a PLF of 80 per cent. The equity capital is assumed to be constant over the life of the Power Purchase agreement (PPA). It has been divided into domestic equity and foreign equity.

b) **Incentive return on equity:** Incentive has been calculated at a flat rate of 25 Paise / Kwh for ex-bus scheduled energy corresponding to scheduled generation in excess of ex-bus energy corresponding to target PLF of 80 per cent.

c) **Tax:** The tax is treated as a component of fixed costs and the guaranteed return on equity is on a post-tax basis. A tax rate per 35 cent assumed for calculation.

d) **Depreciation of the rupee:** In case of the depreciation of the rupee, the increases in the rupee equivalent of foreign equity and debt is covered for calculating the return on equity. However, the depreciation of the rupee has not been assumed for the purpose of calculation of base-level tariffs.

e) **Fuel:** A PLF of 80 per cent is assumed for calculating fuel requirements. The calorific value, Station Heat Rate (SHR) and fuel prices have been suitably assumed, depending on the type of the fuel. No increase in the price of fuel has been assumed for the entire life of the project. This has been considered as a rise in cost of fuel will be a pass through cost.

f) **Discounting rate:** In order to compare two projects, a levelised tariff over the life of the project is calculated, by discounting the tariffs over the life of the Project. A discounting rate of 12 per cent has been assumed.

The computation of tariff is as following.

Table 1.1: Computation of tariff

Thermal Power plant		Coal	Naphtha	Gas
Capacity	(MW)	500	500	500
Capital cost	(Rs million)	22,500	15,000	17,500
Debt-equity ratio		2.33	2.33	2.33
Foreign debt portion	(per cent)	60	60	60
Interest on foreign debt	(per cent per annum)	6.5	6.5	6.5
Interest on Indian debt	(per cent per annum)	11.5	11.5	11.5
Interest on working	(per cent per annum)	10.5	10.5	10.5
Guaranteed PLF	(per cent)	80	80	80
Gross generation	(million kwh)	3,504	3,504	3,504
Calorific value	(kcal per kg)	3,500	10,500	10,000
Station heat rate	(kcal per kwh)	2,500	1800	1,800
Auxiliary consumption	(per cent)	7	3	1
Fuel requirement per	(million tonnes)	2.50	0.60	0.63
Fuel price (incl of transport)	(Rs per tonne)	1,832	25,169	4,780
O & M charges (first year)	(Percentage of capital cost)	2.5	2.5	2.5
Levelised tariff	(Rs per kwh)	2.699	6.735	2.177
First year tariff	(Rs per kwh)	2.835	7.323	2.341
Terminal year tariff	(Rs per kwh)	2.338	6.364	1.756

Source: Adapted from CRISIL Research: Power (Annual Review May 2008)

Note

1) The project cost is the completed project cost in rupees.
2) No provision has been made for escalation in parameters such as fuel price, O &M charges, exchange rate, etc, over the life of the project.
3) The calorific value of gas is in kcal per cubic meter, price is in terms of Rs per thousand cubic meter and the requirement is in billion cubic meter.
4) Levelised tariff is calculated for 25 years in the case of coal-based plants, gas- and naphtha-based plants.
5) Coal prices are for "D' grade coal for which the power plant are having linkages with Coal India limited

1.2 Power generation scenario of India

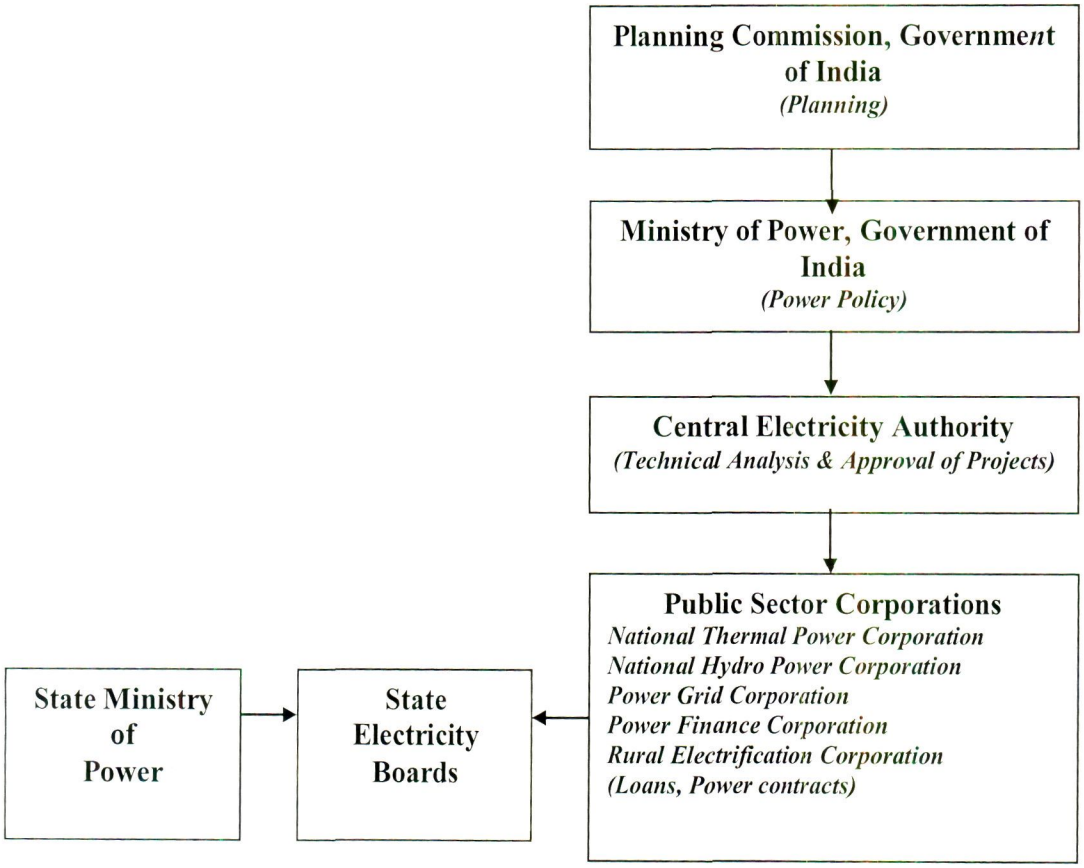
The Indian power sector is one of the most diversified sectors in the world. Sources for power generation range from commercial sources like coal, lignite, natural gas, oil, hydro and nuclear power to other viable non-conventional sources like wind, solar and agriculture & domestic waste. The demand for electricity in the country has been growing at a rapid rate and is expected to grow further in the years to come. In order to meet the increasing requirement of electricity, massive addition to the installed generating capacity in the country is required.

The Ministry of Power of the Government of India (the Government) provides overall guidance to the sector. The Central Electricity Regulatory Commission (CERC) is empowered to regulate the sector at the national level, including central power utilities in accordance with the Electricity Regulatory Commission Act 1998. The central power utilities include the National Thermal Power Corporation, National Hydroelectric Power Corporation & Nuclear Power Corporation, which are engaged in generation and the Power grid Corporation, which is engaged in interstate power transmission. The Government also owns financing institutions devoted solely to power sector lending such as Power Finance Corporation (PFC) and the Rural Electrification Corporation. Recently, the Government established the Power Trading Corporation, to be responsible for power trading among states and between states and central power utilities. At the state level, the state governments control the sector through State Electricity Boards (SEBs) and Electricity Departments (EDs). These SEBs and EDs are responsible for generation, transmission and distribution usually within their own states and territories.

While planning the capacity addition program, the overall objective of sustainable development has been kept in mind. After its structured growth in post-Independence era, Indian power sector has made substantial progress both in terms of enhancing power generation and in making available power to widely distributed geographical boundaries. The Installed generation capacity in the Utility sector has increased to about 205340.26 MW at the end of June 2012. The Indian power sector is largely coal based with the total Installed Capacity comprising of 116333.38 MW (56.65 %) coal based, 18903.05 MW (9.20%) gas based, 1200 MW (0.58 %) diesel generation, 39291.40 MW (19.13%) hydro,

4,780 MW (2.32 %) nuclear and 24832.68 MW (12.09%) from renewable energy sources. Development of Renewable Energy Sources is being accorded special emphasis in view of their inherent advantages. The relation of power generation/transmission/distribution related central public sector entities and their functioning with central government & planning commission and coordination with state governments are as following.

Figure 1.1: Structure & Management of Central Government set up in Power sector



The power generation scenario by the Central Government units, state government and Private sector participation are as following.

Table-1.2: Power Sector at a Glance - "All India" As on 30-06-2012

Sector	**MW**	**%age**
State Sector	86,275.40	42.01
Central Sector	62,073.63	30.22
Private Sector	56,991.23	27.75
Total	**2,05,340.26**	100

Fuel	**MW**	**%age**
Total Thermal	**136436.18**	**66.44**
Coal	116,333.38	56.65
Gas	18,903.05	9.20
Oil	1,199.75	0.58
Hydro (Renewable)	39,291.40	19.13
Nuclear	4,780.00	2.32
RES** (MNRE)	24,832.68	12.09
Total	**2,05,340.26**	**100.00**

Source: Central Electricity Authority (2012)

Renewable Energy Sources(RES) include SHP, BG, BP, U&I and Wind Energy
SHP= Small Hydro Project ,BG= Biomass Gasifier ,BP= Biomass Power,
U & I=Urban & Industrial Waste Power, RES**=Renewable Energy Sources
The Hydro generating stations with installed capacity less than or equal to 25 MW are indicated under RES.

Table-1.3: Installed capacity of power utilities in different States and Union Territories of India in MW as of 30-06-2012

Rank	State/Union Territory	Total Installed Capacity	Total Thermal	Nuclear	Hydro	Renewable energy**
	India	205340.26	136436.18	4780.00	39291.40	24832.68
1	Maharashtra	26499.35	18790.22	690.14	3331.84	3687.15
2	Gujarat	23086.74	18161.82	559.32	772.00	3593.60
3	Tamil Nadu	17656.22	7617.33	524.00	2122.20	7392.69
4	Andhra Pradesh	16384.83	11471.08	275.78	3734.53	903.44
5	Uttar Pradesh	13682.99	10822.87	335.72	1821.42	702.98
6	Karnataka	13465.44	6355.65	254.86	3599.80	3255.13
7	Rajasthan	10247.48	5777.13	573.00	1527.80	2369.55
8	Madhya Pradesh	9085.36	5106.15	273.24	3223.66	482.31
9	West Bengal	8507.29	7229.54	0.00	1116.30	161.45
10	Haryana	7573.25	5987.21	109.16	1343.18	113.70
11	Punjab	7114.96	3538.46	208.04	3014.89	353.57
12	Delhi Territory	6932.15	6125.42	122.08	666.12	18.53
13	Orissa	6596.33	4332.10	0.00	2166.93	97.30
14	Chhattisgarh	5649.11	5207.44	47.52	120.00	274.15
15	Damodar Valley Corpn (WB & Jhar)	5288.86	5095.60	0.00	193.26	0.00
16	Kerala	3827.73	1687.94	95.60	1881.50	162.69
17	Himachal Pradesh	3714.10	197.17	34.08	2950.94	531.91
18	Jharkhand	3049.86	2828.88	0.00	200.93	20.05
19	Uttarakhand	2556.56	350.23	22.28	1998.18	185.87
20	Jammu and Kashmir	2356.15	609.59	77.00	1539.03	130.53
21	Bihar	1833.93	1624.70	0.00	129.43	79.80

22	Assam	1020.04	559.21	0.00	429.72	31.11
23	Goa	418.32	362.47	0.00	0.00	30.05
24	Meghalaya	373.62	28.01	0.00	314.58	31.03
25	Pondicherry Territory	279.66	260.35	19.28	0.00	0.03
26	Tripura	265.07	186.69	0.00	62.37	16.01
27	Sikkim	206.48	79.10	0.00	75.27	52.11
28	Arunachal Pradesh	213.76	36.93	0.00	97.57	79.26
29	Manipur	157.80	71.37	0.00	80.98	5.45
30	Mizoram	138.92	68.14	0.00	34.31	36.47
31	Nagaland	103.18	21.19	0.00	53.32	28.67
32	NLC	100.17	100.17	0.00	0.00	0.00
33	Chandigarh Territory (T)	105.71	45.13	8.84	51.74	0.00
34	Dadra and Nagar Haveli (T)	75.38	66.92	8.46	0.00	0.00
35	Daman and Diu (T)	44.90	37.52	7.38	0.00	0.00
36	Andaman and Nicobar Islands (T)	65.40	60.05	0.00	0.00	5.35
37	Lakshadweep (T)	10.72	9.97	0.00	0.00	0.75

Source: Ministry of Power, Govt. of India, through website (2012)

**Renewable Energy Sources (RES) includes small hydro projects, biomass gasifiers, biomass power and urban & industrial waste power.

The sector added conventional capacity of 50,502 MW and almost 4,460 MW of wind and solar during 2011-12 the conventional capacity addition was 69 per cent higher than the previous year. Coal accounted for 90 per cent of the total capacity addition. This was followed by hydropower. (7 per cent) and gas based capacity (3 per cent) overall, the capacity addition during the Eleventh Plan period was 54,964 MW. This accounts for 88 per cent of the revised target of 62,374 MW set by the planning commission in its mid-term appraisal and 70 per cent of the original target of 78,700 MW. During the Eleventh Plan period 12,871 MW of renewable capacity was added up to January 2012. The target for the plan period is to add 14000 MW of grid connected renewable capacity.

The working group on power for the 12th plan constituted by the Planning Commission aims for a capacity addition of 75,785 MW of conventional capacity, 18,500 MW of renewable capacity and 13,000 MW of the captive capacity. The conventional capacity addition targets of 100,000 MW and also the original Eleventh Plan Target of 78,700 MW with the achievements in the previous plan periods certainly required policymakers to review and set realistic targets. The cutback is perhaps a fallout of the fuel crisis (particularly coal and gas) since the majority of future capacity would be thermal. The capacity addition target includes 62,695 MW of coal based capacity, 9,204 MW of hydro capacity, 2800 MW of nuclear capacity and 1086 MW of gas based capacity.

The majority (about 90%) of the proposed coal-based capacity addition of 56,373 MW will be based on domestic coal resources comprising linkages (38,548 MW) and captive coal blocks (17825 MW), remaining about 6292 MW (10 per cent) of the capacity addition will be based on imported coal. Over 40,000 MW of coal based (or 64 %) will be contributed by the private sector followed by 19 per cent by states and 17 per cent by the center.

The private sector is expected to contribute the largest capacity at 42,131 MW (or 56 %) of the total capacity addition. The central sector is expected to account for 19,858 MW (26 %) and the state sector, which currently has the highest installed capacity, will continue only 13,796 MW (about 18 per cent).

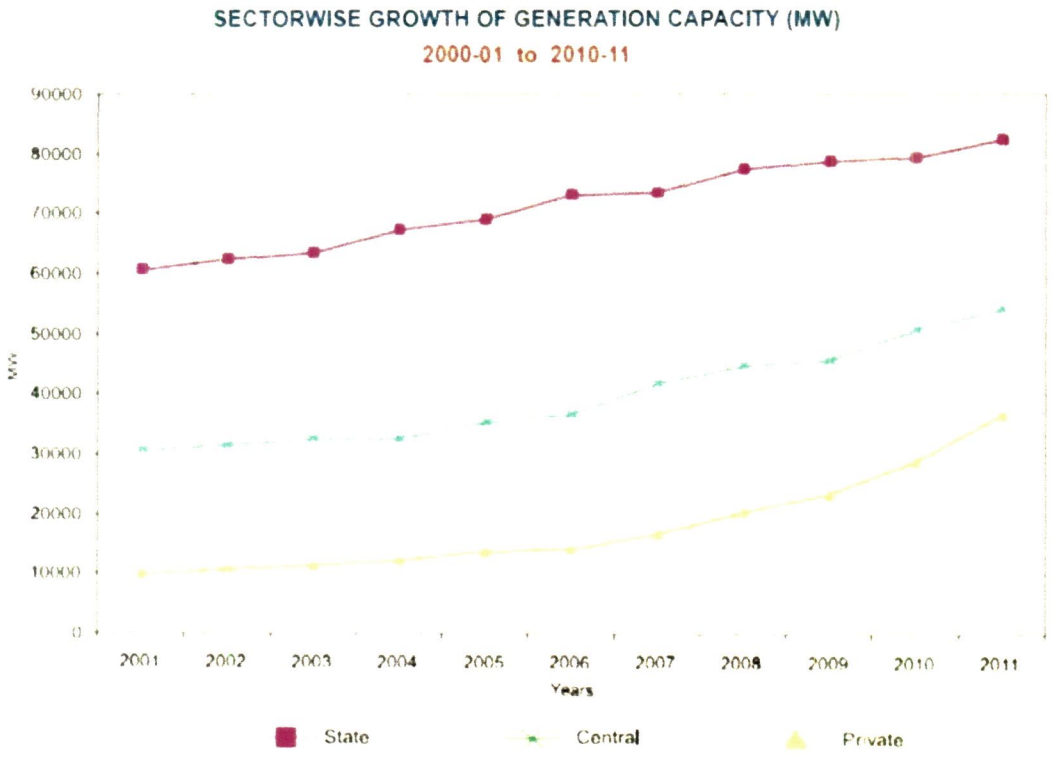
Table-1.4 Growth of Installed generating capacity in India-Mode wise Utilities

Sr No	As on	Hydro	Thermal				Others		Total
			Coal / lignite	Gas	Diesel	Total	Nuclear	RES	MW
1.	31.12.47	508	756	0	98	854	0	0	1362
2.	31.12.50	560	1004	0	149	1153	0	0	1713
3.	31.03.56 (End of the 1st Plan)	1061	1597	0	228	1825	0	0	2886
4.	31.03.61 (End of the 2nd Plan)	1917	2436	0	300	2736	0	0	4653
5.	31.03.66 (End of the 3rd Plan)	4124	4417	134	352	4903	0	0	9027
6.	31.03.69 (End of the 3 Annual plans)	5907	6640	134	276	7050	0	0	12957
7.	31.03.74 (End of the 4th Plan)	6966	8652	165	241	9058	640	0	16664
8.	31.03.79 (End of the 5th Plan)	10833	14875	168	164	15207	640	0	26680
9.	31.03.80 (End of the 2nd Annual Plans)	11384	15991	268	165	16424	640	0	28448
10.	31.03.85 (End of the 6th Plan)	14460	26311	542	177	27030	1095	0	42585
11.	31.03.90 (End of the 7th Plan)	18307	41236	2343	165	43744	1565	0	63616
12.	31.03.92 (End of the 2nd Annual Plans)	19194	44791	3095	168	48054	1785	32	69065
13.	31.03.97 (End of the 8th Plan)	21658	54154	6562	294	61010	2225	902	85795
14.	31.03.02 (End of the 9th Plan)	26269	62131	11163	1135	74429	2720	1628	105046
15.	31.03.07 (End of the 10th Plan)	34654	71121	13692	1202	86015	3900	7760	132329
16.	31.03.08 (End of the 1st Year of 11th Plan)	35909	76049	14656	1202	91907	4120	11125	143061
17.	31.03.09 (End of the 2nd Year of 11th Plan)	36846**	77649	14876	1200	93725	4120	13242	147965
18.	31.03.10 (End of the 3rd Year of 11th Plan)	36863	84198	17056	1200	102454	4560	15521	159398
19.	31.03.11 (End of the 4th Year of 11th Plan)	37567	93918	17706	1200	112824	4780	18455#	173626
20.	31.03.12 (End of the 5th Year of 12th Plan)	38990*	112022	18381	1200	131603	4780	24503	199876

Source: Ministry of Power & Indian Infrastructure May 2012 Page No. 30
(#) RES:- Renewable Energy Sources includes Hydro Electric Stations of Installed Capacity 25.00 MW and below (as on 31.01.2011).
** After accounting for derations / uprations etc. and reconciliation with utilities, the installed capacity figure of 36878 MW as on 31.03.2009. works out to 36846 MW. *Provisional //

At present, the demand & supply gap is extremely large. Additional capacity needs have been forecasted at 56.6 GW between now and 2030. Power industry is facing significant time pressure and financial constraints in developing this additional capacity. This has created opportunities for private power generation. Recent efforts to liberalize the electricity supply industry have been reflected in the Department of Energy (DoE)'s mandate that Independent Power Producers (IPPs) make up 30.0 per cent of new generation capacity by 2030.

Figure 1.2



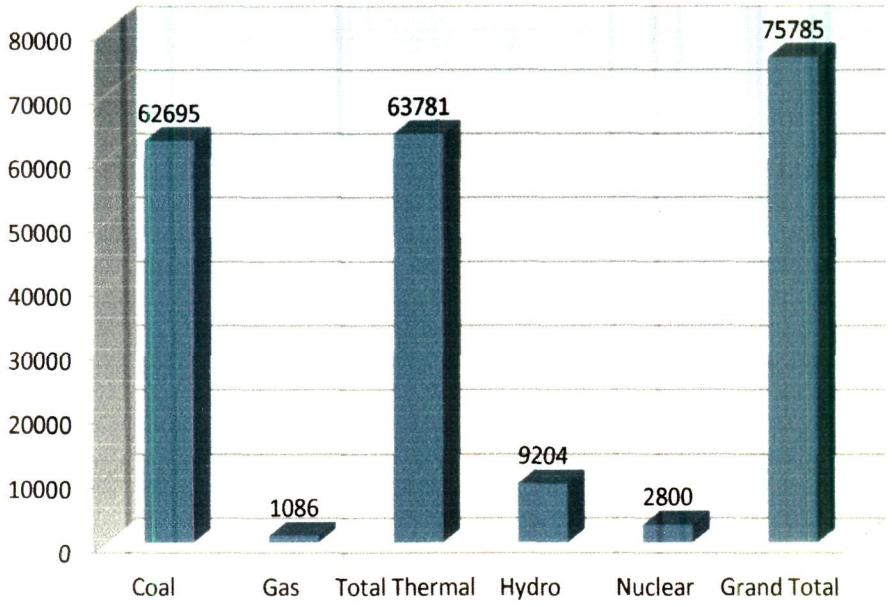
Source: Ministry of Power, Government of India

Table 1.5: All India Power Supply Position Energy-Wise & Peak – Wise (Utilities) 1984-85 to 2010-11

	Energy				Peak Demand			
Year	Requirement (GWh)	Availability (GWh)	Deficit (GWh)	Deficit (%)	Demand (MW)	Availability (MW)	Deficit (MW)	Deficit (%)
1984-85	155432	145013	10419	6.70	25810	22800	3010	11.66
1985-86	170746	157262	13484	7.90	28090	24215	3875	13.79
1986-87	192356	174276	18080	9.40	30850	26924	3926	12.73
1987-88	210993	187976	23017	10.91	31990	28242	3748	11.72
1988-89	223194	205909	17285	7.74	36245	31713	4532	12.50
1989-90	247762	228151	19611	7.92	40385	33658	6727	16.66
1990-91	267632	246560	21072	7.87	44005	37171	6834	15.53
1991-92	288974	266432	22542	7.80	48005	39027	9028	18.79
1992-93	305266	279824	25442	8.33	52805	41984	10821	20.49
1993-94	323252	299494	23758	7.35	54875	44830	10045	18.31
1994-95	352260	327281	24979	7.09	57530	48066	9464	16.45
1995-96	389721	354045	35676	9.15	60981	49836	11145	18.28
1996-97	413490	365900	47590	11.51	63853	52376	11477	17.97
1997-98	424505	390330	34175	8.05	65435	58042	7393	11.30
1998-99	446584	420235	26349	5.90	67905	58445	9460	13.93
1999-00	480430	450594	29836	6.21	72669	63691	8978	12.35
2000-01	507216	467409	39807	7.85	74872	65628	9244	12.35
2001-02	522537	483350	39187	7.50	78441	69189	9252	11.79
2002-03	545674	497589	48085	8.81	81492	71547	9945	12.20
2003-04	559264	519398	39866	7.13	84574	75066	9508	11.24
2004-05	591373	548115	43258	7.31	87906	77652	10254	11.66
2005-06	631757	578819	52938	8.38	93255	81792	11463	12.29
2006-07	690587	624495	66092	9.57	100715	86818	13897	13.80
2007-08	739343	666007	73336	9.92	108866	90793	18073	16.60
2008-09	777039	691038	86001	11.07	109809	96785	13024	11.86
2009-10	830594	746644	83950	10.11	119166	104009	15157	12.72
2010-11	861591	788355	73236	8.50	122287	110256	12031	9.84

Source: Ministry of Power, Government of India

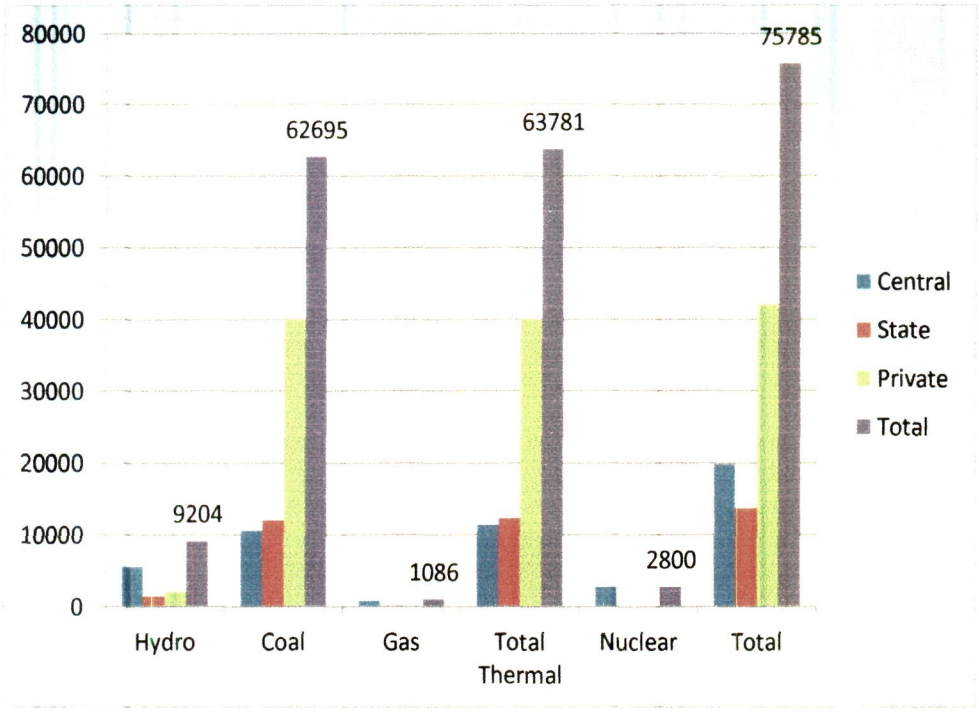
Figure 1.3: Capacity addition requirement (MW) during 12th plan (2012-2017)



Source: Report of working group for 12th five year plan (Govt of India, Ministry of Power Jan 2012)

(Type of Capacity Demand corresponding to 9% GDP GR & 0.9 Elasticity)

Fig 1.4 Sector wise breakup of 12th plan (2012-2017) capacity in MW



Source: Report of working group for 12th five year plan (Govt of India, Ministry of Power Jan 2012)

From the above data it is inferred that in the 12th five year plan there is going to be a larger role of private sector in further capacity addition. The private sector's contribution to the power sector in the 11th Plan has been much more than what the planning commission had originally anticipated. The commission had envisaged the private sector to contribute only 19% of new capacities at the beginning of the Plan. But in 2010, it revised the figure to 30%. The private sector made a significant contribution with a share of over 58 % during 2011-12 and 42 % during the entire eleventh plan period. It is now expected that the private sector should contribute about 56% of new capacities in the 12th five year plan (2012-17).

The financial health of many State Electricity Boards (SEB) has been deteriorating due to insufficient cost recovery, inadequate tariffs and high operating costs. Consequently, most of the SEBs are now being restructured under various initiatives to achieve financial viability and improve operational efficiency.

Ever since beginning of the power sector in India the enacting rules have been changed and updated from time to time. From the following table it is evident that the sector has been under the focus of various governments from decades back, however the kind of reform needs to be there in consistency and pace with the development taking place across the country in various economic perspective and globalization.

Table-1.6 Regulations for the Power Sector

Laws / Policies	Objective	Impact
The Electricity Act, 1910	Infrastructural frame work for supply of electricity	Attracted private capital
The Electricity Act, 1948	Mandated creation of SEBs	Ownership in the hands of SEBs
The Amendment /IPP Process, 1991	Private investment in Power generation	Projects from private players came into generation
Mega Power Policy, 1995	Setting up of Mega Power Plants	Mega Power Plants get benefited
The Regulatory Commission Act, 1998	Provision for setting up of central State Electricity Regulatory Commission	Independent regulatory mechanism
The Electricity (Amendment) act, 1998	Making transmission a separate activity	Central Transmission Utility & State Transmission Utilities were setup
Electricity Act, 2003	Providing reliable and quality power to customers at reasonable rate	Investments in capacity addition
National Electricity Policy 2005	Accelerated development of the power sector	Economics of generation using different resources
National Tariff Policy 2005	Tariff Structuring	Attractive tariff for players

Source: Ministry of Power & compilation by author

From the above table it is inferred that the Government of India has tried to reform the Power sector since very beginning as per the changed requirements and the need of the hour. This has made significant impact on the scenario of power generation in the country. It becomes more encouraging for private sector participation in view of the potential to grow and with the advent of new technologies and changing economic scenario across globe, the sector may lead

towards a market driven mechanism of tariff fixation. This will not only make the Government free from the burden of subsidy but explore the potentials of market driven economics in the country.

1.3 Power generation capacity addition: Role of private sector players

Many private players have announced huge capacity additions. Announcement of the top 16 private players itself totals to more than 120 GW. It is believed that a small proportion (around 30 per cent) will probably materialize and that too mostly in the Twelfth Plan.

Generation capacity additions are estimated at a realistic level at estimated at 69 GW against the government targets of 82 GW in the Twelfth Plan. It is estimated that the demand to growth would be at around 8 per cent in the Twelfth Plan. Concomitant additions are expected in transmission and distribution, in line with the generation capacities.

The investment expected during the Eleventh Plan was around 3.5 trillion with state having the major share at 43 per cent of the investments. Going ahead, in the Twelfth Plan, it is expected to be in reverse trend, as the private capacity addition would be more then central and state put together. The investments are estimated to be at 4.7 trillion with private players share jumping from 16 per cent to 40 per cent (about 3 fold increase).

Private players have made announcements of capacity addition for addressing the energy demand-supply gap from time to time. The government had announced a liquid fuel policy which focused on adding capacities, based on liquid fuel (naphtha, fuel oil etc). On the recommendation of state governments, IPP (Independent Power Producer) Planned around 12 GW of capacity on liquid fuel, which was subsequently modified to naphtha-based plants. Though many private players had shown interest in setting up these capacities, only around 5 GW of capacities materialized. Most of the projects fizzled due to delays in financial closers, higher costs of petroleum products because of soaring crude price and SEBs unwilling to buy power at a high cost.

Table-1.7 Announcement by top private sector power producers

Top private players	Total announcement MW
Reliance Power	28195
JSW Energy	15000
IndiaBulls Power Service	11000
Tata Power	10000
Lanco	10000
Adani	10000
Jayprakash Power	5275
Videocon	5000
Jindal Power (JSPL+JP)	4670
Torrent Power	4500
CESC	4250
Essar Power	4000
GVK Power	3660
GMR Energy	3440
Sterlite Energy	2400
Visa Power	1200
Total Top Players	122590

Source: CRISIL Research: Power, (Annual Review May 2008)

In the current situation, most of the projects are coal-based. Many coal blocks have already been allocated to private players for mitigating the fuel risk to certain extent. In this

scenario, it is required to assess the likely success in implementation of these announced capacities over the next decade, especially in relation on the expected growth in demand over this period.

In order to meet the shortfall between requirement of domestic coal and its availability, power utilities have been importing coal for blending in power stations designed to operate on domestic coal. In addition, coal is also imported by thermal power stations designed to operate on imported coal. Increase in variable cost of generation with 10% of blending of imported coal in the plant design to operate on the domestic coal is of the order of 10 to 45 paisa per Kilowatt hour depending upon location of plant. To keep the operating cost of generating power plants at reasonable level, the new thermal power plants are based on super critical / ultra super critical technology with higher plant efficiency.

The government in 2007 allocated many coal mines to private sector players for development. Out of a total of 165 blocks, coal blocks allotted to power sector were 74 (with a 62 per cent share of the reserves) of the 74 block for power sector 23 were allocated to private players - within this, 17 blocks were allotted to Independent Power Producers (IPPs) thus have a share of 20 per cent of the total reserves allocated for power sector. These reserves of 3619 million tons (assuming a station heat rate a 2500 kcal / KWh and a calorific value of 3500 Kcal/Kg) can support 23,160 MW of power capacity for a project of 25 years.
Thus, based on the scenario of the top 16 players regarding fuel supply, captive and imported (assuming the 2 UMPP's would tie up supplies) coal supplies were assured for private players to set up capacities of at least 31 GW in the Twelfth Plan.

The comfort comes from the captive / tied up coat reserves available with players to the capacity announcement made by them.

With the availability of captive coal blocks, the top private players would be able to add around 27 GW and after including the Tilaiya coal mine reserves, it would add up to 31 GW. Keeping this is lieu with capacity addition announcements made by each player, we see a greater assurance (driven by fuel available) of capacity addition from players like Jindal Power Total and Reliance.

Other issues related to capacity addition are as following.

1) Land clearance

Typically, land required for 1 MW is around 0.8 acres; hence with capacity announcement of over 120 GW by top private players there would be requirements of around 1 lakh acre of land and that too with closer proximity to fuel source and water.

2) Environmental and forest clearances

Twenty power projects were awaiting environmental clearance (as on 29th Aug 2012,PTI) while another 28 projects were yet to get their clearance for diversion of forest land, the Environment Ministry has said. It is worth mentioning that environmental and forest clearance were given to 166 and 143 power projects respectively during the last three years, the same were rejected in few cases. Water supply is another major issue that could arise in states with fewer water bodies.

Though there are number of steps to ensure timely decisions on the applications for environmental clearances by constituting sector specific Expert Appraisal Committees (EACs) for appraisal of thermal, hydro and nuclear power projects ,the main reasons for pendency are delay in submission of Environmental Impact Assessment report and Environment Management Plan including public hearing report, deficiency in the Environmental Impact Assessment (EIA) / Environment Management Plant (EMP) reports inadequate data and non-submission of complete information by the project proponents.

3) Equipment Scenario

The domestic availability of generation equipment Boiler Turbine Generator (BTG) to meet the capacity addition of 78 GW is insufficient. Bharat Heavy Electricals Ltd (BHEL) the major player has capacity to produce only 10 GW each year though it is planning to ramp up its capacity. Larson & Toubro (L&T) is planning to foray in equipment manufacturing by setting up a capacity of 4 GW . Reliance Energy and NTPC are also planning to also set up individual equipment facilities. In the twelfth Plan, there would however, be continued imports to satisfy the deficit in the BTG Scenario.

Scope of Merchant Power Plants

In lieu with the continued deficit scenario, many players are planning to set up merchant power plants for maximizing the pricing opportunity currently prevailing in the system. A merchant power plant does not have a signed power purchase agreement, which permits the players to get a market determined rate for the sale of power and earn higher returns. Price for merchant power would be driven by some of the following factors:

1) Unscheduled interchange charges
2) Trading charges

Addition of power generation capacity by private players (through Case1* – Case 2 route):** The overall adding announced by top private players total a gargantuan amount of 120 GW; It is estimated that around 36 GW (around 30 per cent of the announced capacities) of this to be added by the private players in the Twelfth Plan. Theses capacity would be added to meet demand in state (which are resource and cash constrained to step projects on their own) through Case1* – Case 2**[1] project awarded through International Competitive Bidding (ICB) route.

Captive coal blocks allocated to private players along with the imported coal tie ups (in case of UMPPs) provide an assured supply to meet 31 GW of power generation which would act as a support for these huge capacity additions through the private route. However, the key risk related to timely development of coal blocks. Continued deficit scenario has also increased opportunity for setting up of Merchant capacities and earns higher returns. At least around 7-8 GW of merchant capacity in planned. Going ahead with this the Research expected the merchant power plants to be line with regulated returns due to competition. This is backed by balanced scenario in the economy and strong competition brewing up in the Twelfth Plan. Hence, it is believed that standalone Merchant power plant operation would not be viable in the long term.

1

*Case 1: The private developer has to make arrangement for the land, fuel and water linkages
**Case 2: The government facilitates arrangement for the land, fuel and water linkages then calls for competitive bids

India's growth story so far has been impressive with Gross Domestic Product (GDP) growing at a brisk pace of 9 per cent; expected to be around the 8 per cent mark for the next few years. Infrastructure need to grow at a similar level for sustaining this GPD growth.

Overall infrastructure development has been an inherent issue in India. However, reforms and regulatory changes, of the last few years, have ensured acceleration in the pace of Infrastructure growth, including the power sector. Nevertheless, a lot is still to be achieved.

The power sector has continued to witness a deficit scenario in the trend plan. Capacity addition has been around 50 per cent compared to the targets. The Eleventh Plan government targets had been at 78,577 MW. With the Electricity Act, 2003 and opening of the power sector, private players can enter generation without requiring a license. This, coupled with the growing deficit scenario, has been the main for private players announcing huge capacity additions. The captive coal blocks allocated by the coal ministry in 2007, to private players has also facilitated this huge capacity addition program.

In this thesis, it is focused to evaluate the potential of actual private sector participation in the power sector for the generation segment. Given the continuing power deficit levels and rising cost of power, long-term planning for power purchases through an appropriate mix remains important. It is especially the case with Dis-Coms (Distribution Companies) in states with high levels of power deficit, as it would enable them to expedite capacity addition by engaging the private sector and thus meet the growing power demand in their license area in a cost-effective manner. While competitive bidding has been recommended for procurement of power by Dis-Coms as per the provisions of National Electricity Policy (2005) and Electricity Act (2003), many states are yet to follow the same.

Thrust on the competitive bidding for procurement of power by the discoms should increase going forward, given that the exemption available of five years has completed in January 2011 for state/central sector owned generating utilities.

Gujarat has been one of the successful states in terms of sourcing power the bid route and is amongst the first mover among all the states. It has not only been able to contract the highest quantum of long–term contracted capacity (at about 6000 MW) entirely through '*Case*

II' competitive bidding route but also at relatively lower tariffs (average levellised tariff at Rs. 2.5/unit) as compared with that in other states following a similar route.

Some states have adopted 'Case II' bidding, which in turn has enabled discoms to contract capacity at a lower tariff level than in 'Case I' due to the attractiveness of such projects aided by proximity to coal mines in some cases and the aggressive bidding approach by private Independent Power Producers (IPPs) due to upfront support available from the procuring agency/State Government.

While the average tariff through competitive bidding (Case I) is observed to be between Rs. 2.5–3.2/Unit for coal-based plants, sustainability of such tariffs remains to be seen going forward, especially under the environment of rising commodity prices, expected continuance of inadequate domestic coal availability leading to increased dependence on imported coal, and also possibilities of delays in project execution.

1.4 Reforms undertaken by different Indian States:

The various reform initiatives taken in different states are detailed as following.

1.4.1 Reforms of Andhra Pradesh:

All the Generating Stations owned by erstwhile APSEB (Andhra Pradesh State Electricity Board) were transferred to the control of APGENCO which came into existence on 28.12.1998 and commenced operations from 01.02.1999. It was formed as part of power sector reforms by the state government to unbundle the activities relating to Generation, Transmission and Distribution of Power.

The installed capacity of APGENCO as on 01.09.2008 was 7048.9 MW comprising 3382.50 MW Thermal, 3664.4 MW Hydro and 2 MW Wind power stations, and contributes about half the total Energy Requirement of Andhra Pradesh. APGENCO was third largest power generating utility in the Country next to NTPC and MAHAGENCO. It's installed Hydro capacity of 3664.4 MW is the second highest among the Country.

1.4.2 Arunachal Pradesh Electricity Department

Department of Power, Arunachal Pradesh, is a State Government Department, assigned to carry out all the activities of Power Sector, enforced upon the relevant Acts and Rules of Electricity, Power & Energy, co-ordinate among all the power utilities and stake holders operating in the state and advice the State Government on all matters relating to Power, Electricity & Energy. The Department of Power also implements various Power Projects sanctioned and sponsored by the State and Central Governments. Hydro Power and Non-Conventional Energy activities, under the domain of this department, are independently functioning in the names of: Department of Hydro Power Development (DHPD) and Arunachal Pradesh Energy Development Agency (APEDA).

1.4.3 Reforms in Assam

Power is a critical infrastructure for economic growth. Before its unbundling Assam State Electricity Board (ASEB) was the sole agency to generate, transmit and distribute electricity to the entire state of Assam. ASEB was created in 1975 under the Electricity (Supply) Act 1948. Power sector reforms were initiated in the country in the year 1991 enabling private sector investment in Generation to begin with. State Governments also followed up by reforming State owned utilities. Orissa was the first State to implement comprehensive reforms by unbundling Orissa State Electricity Board. The electricity Regulatory Commissions Act, 1998 enabled constitution of regulatory commissions by Central and State Governments. Further thrust was given to the power sector with the enactment of the Electricity Act 2003. In Assam, the State Regulatory Commission of Assam was set up in May 2001.

In tune with Power Reforms and Restructuring process Government of Assam and ASEB had undertaken the following steps

a. MOU signed with GOI on Power reforms in Feb 2001.
b. Tripartite Agreement Signed between GOI,ADB & GOA in Dec 2003.
c. Unbundling of ASEB into five different companies hiving away Generation, Transmission, and Distribution activities into separate companies in December are.

1) Lower Assam Electricity Distribution Company Ltd (LAEDCL)

2) Upper Assam Electricity Distribution Company Ltd (UAEDCL)
3) Central Assam Electricity Distribution Company Ltd (CAEDCL)
4) Assam Power Generation Company Ltd (APGCL)
5) Assam Electricity Grid Corporation Ltd (AEGCL)

1.4.4 Reforms in Chhattisgarh

The Chhattisgarh State was formed as per the Madhya Pradesh Reorganization Act 2000. The President of India gave his consent to this Act on the 25th August 2000. The Government of India subsequently set the first day of November 2000 as the day on which the State of Madhya Pradesh would be bifurcated into State of Chhattisgarh and State of Madhya Pradesh.

Chhattisgarh State Electricity Board was formed in accordance with the Section 5 of the Electricity Supply Act 1948 as per the Notification published in the gazette of the Government of Chhattisgarh dated 15th November 2000. Chhattisgarh State Electricity Board (CSEB) became functional w.e.f. 01.12.2000.

The Chhattisgarh State Electricity Board has been reorganized into following five companies in accordance with the provisions contained in the Electricity Act 2003 by the Govt. of Chhattisgarh vide Notification dated 19.12.2008.

1) Chhattisgarh State Power Holding Company Limited
2) Chhattisgarh State Power Generation Company Limited (Genco)
3) Chhattisgarh State Power Transmission Company Limited (Transco)
4) Chhattisgarh State Power Distribution Company Limited (Disco)
5) Chhattisgarh State Power Trading Company Limited

1.4.5 Reform of Delhi Vidyut Board

The Delhi Vidyut Board was formed by the Government of NCT Delhi in 1997 for the purpose of generation and distribution of power to the entire area of NCT of Delhi except the areas falling within the jurisdiction of NDMC and Delhi Cantonment Board. On July 1st 2002, The Delhi Vidyut Board (DVB) was unbundled into six successor companies:

- Delhi Power Supply Company Limited (DPCL)- Holding Company;

- Delhi Transco Limited (DTL) – TRANSCO;
- Indraprastha Power Generation Company Limited (IPGCL) – GENCO;
- BSES Rajdhani Power Limited (BRPL) – DISCOM;
- BSES Yamuna Power Limited (BYPL) – DISCOM;
- North Delhi Power Limited (NDPL) – DISCOM.

1.4.6 Reforms of Gujarat

As a part of Power Reform Process, the Electricity Act, 2003, was passed by the Central Government and Gujarat Electricity Industry (Re-organization & Regulation) Act, 2003, was passed by the Government of Gujarat to restructure the Electricity Industry with an aim to improve efficiency in management and delivery of services to consumers.

Under the provisions of the said Acts Govt. of Gujarat framed the Gujarat Electricity Industry Re-organization & Comprehensive Transfer Scheme, 2003, (the Transfer Scheme) vide Government Notification dated 24-10-2003 for transfer of assets/liabilities etc. of erstwhile GEB to the successor entities.

Accordingly erstwhile Gujarat Electricity Board (GEB) was reorganized effective from 1st April, 2005 in to Seven Companies with functional responsibilities of Trading, Generation, Transmission and Distribution etc.

The Companies incorporated are as under:

a) Gujarat Urja Vikas Nigam Ltd. (GUVNL) -Holding Company
b) Gujarat State Electricity Corp. Ltd.(GSECL) -Generation
c) Gujarat Energy Transmission Corp. Ltd.(GETCO) -Transmission
d) Uttar Gujarat Vij Company Ltd. (UGVCL) -Distribution
e) Dakshin Gujarat Vij Company Ltd. (DGVCL) -Distribution
f) Madhya Gujarat Vij Company Ltd. (MGVCL) -Distribution
g) Paschim Gujarat Vij Company Ltd. (PGVCL) Distribution

1.4.7 Reforms of Haryana

Haryana Power sector comprises four wholly State-owned Corporations viz HPGCL, HVPNL, UHBVNL and DHBVNL which after unbundling of the HSEB in 1998 are responsible for

power generation, transmission, distribution and trading in the State. These utilities and the HERC work under the administrative control of the Deptt. of Power which is headed by Principal Secretary, Power.

The State power sector was restructured on August 14, 1998. The Haryana State Electricity Board (HSEB) was reorganized initially into two State-owned Corporations namely Haryana Vidyut Prasaran Nigam Ltd. (HVPN) and responsible for operation and maintenance of State's own power generating stations. HVPNL was entrusted the power transmission and distribution functions. Simultaneously, an independent regulatory body i.e. Haryana Electricity Regulatory Commission (HERC), was constituted to aid and advise the State Govt. on the development of the power sector, to regulate the power utilities and take appropriate measure to balance the interest of various stake-holders in the power sector, namely electricity consumers, power entities and generation companies etc.

HVPNL was further reorganized on July 1, 1999 by carving out two more Corporations, namely Uttar Haryana Bijli Vitran Nigam Ltd. (UHBVNL) and Dakshin Haryana Bijli Vitran Nigam Ltd. (DHBVNL) with the responsibility of distribution and retail supply of power within their jurisdiction. While UHBVNL is responsible for Panchkula, Ambala, Yamunanagar, Kurukshetra, Kaithal, Karnal, Panipat, Sonepat, Rohtak, Jhajjar and Jind districts, DHBVN caters to Hisar, Fatehabad, Bhiwani, Sirsa, Faridabad, Gurgaon, Mewat, Rewari and Narnaul districts.

1.4.8 Reforms of Orissa

Orissa was the first State to get assistance from the World Bank for restructuring. In Orissa, the generating plants were running at 36 percent PLF in 1993-94, transmission and distribution losses were at 43 percent and the proportion of bills collected was only 17 percent. The entire Orissa project was in three parts and the total cost of the project was US $ 997.2 million. The World Bank provided $ 350 million and the Overseas Development Agency of the UK provided $ 110 million.

Northern region remains the most potential area for installed power with maximum shortfalls followed by Southern region. This provides an opportunity to bridge demand-supply

gap in the Indian power sector. According to the research report "Indian Power Sector Analysis" installed power capacity is projected to add more than 45,000 MW by 2013-14. The addition will be insufficient for the growing Indian economy. Rising investment into infrastructure and speed of urbanization will increase demand for power in some states.

Demand driven power sector will boost private investment especially merchant power plants. In addition, renewable power will remain a favorite investment avenue as more than 80% renewable power is generated by private players.

1.5 Global Scenario of Power generation

Power sector reforms are ought to be in line with the product market competition, privatization and regulation. The process of reform in the electricity sector in developed countries has been well documented and appears to have been reasonably successful (Pollitt, 1995; Newbery, 1999).

Developing countries can suffer from serious institutional weaknesses, meaning that planned reforms may not produce their intended benefits and thus the path to reform has been more difficult In developing countries, (Parker, 2002).

In most developing countries the process of capacity building and establishing adequate regulatory institutions has been a slow and complex one, lagging behind the entry of private operators in the electricity sector.

In the past decade, the pace of reform and change in the electricity sector has rapidly increased and the nature of the reforms adopted has become steadily more sophisticated. Many countries, from the very large, such as China, to the very small, such as Bolivia, have enthusiastically adapted earlier reform models to their own needs and circumstances. Both developed and developing countries have embarked on a program of liberalizing and reforming their power sectors. The principal driving forces behind this reform movement, described by a number of authors include the following:

(a) the poor performance of the state-run electricity sector in terms of high costs, inadequate expansion of access to electricity service for the population, and/or unreliable supply;
(b) the inability of the state sector to finance needed expenditures on new investment and/or maintenance;
(c) the need to remove subsidies to the sector in order to release resources for other pressing public expenditure needs; and
(d) the desire to raise immediate revenue for the government through the sale of assets from the sector.

In many countries all these factors have been present at the same time, with the notable exceptions of countries in Eastern Europe and the former Soviet Union, where policies of encouraging heavy industrialization had left the power sector with short-term excess capacity, so that new capacity was a lower priority than in most other countries. Although some traditional state-owned and run enterprises have performed well and indeed were often formed by nationalizing private-sector companies that were either too small to exploit economies of scale or too large to prevent monopolistic abuse, there was an increasing awareness during the 1980s that a lengthy period of state ownership, without the forces of competition or the incentives of the profit motive to improve performance, eventually resulted in excessive costs low service quality, poor investment decisions and lack of innovation in supplying customers.

Although many countries have expressed some dissatisfaction with the operation of their state-owned power sector, there has been a wide range of responses to the problems perceived. Some countries have felt it impossible or undesirable to embark on any reform strategy that entails opening electricity production or sales to private participants, whereas other countries, although willing to engage private participation, have chosen very different strategies for doing so. The variety of responses that have already emerged globally is one of the most striking features of the power sector in the past decade.

There has been considerable interest in the wider issues of why some countries chose to undergo economy-wide reforms in terms of reducing the role of the state, introducing the private sector into markets once exclusively reserved for previously state-owned enterprises,

and generally liberalizing control both a wide-ranging analysis and discussion of these issues for developing countries suggest that two essential conditions must be met before reform is attempted. (a) It should be generally perceived in the country that reform is desirable and (b) Carrying out the reform agenda should be politically feasible.

Electricity-sector reform has been advocated by such international lending agencies as the world bank the European Bank for Reconstruction and Development, and the Inter-American Development Bank as well as by such organizations as the World Energy Council. To assess what has been achieved by which countries, these bodies have carried out analyses of the steps taken by their member nations. At the same time, the private sector has a great interest in knowing what is happening on a comparative basis, so that investment decisions can be put into proper context, and a number of publications have addressed this need for information. From a global perspective, the movement to reform power sectors appears to be sweeping across the developing world at a rate similar to that in the industrialized world.

The World Bank Group has reviewed and evaluated its lending and advisory assistance during the 1990s in supporting electricity sector reform and private sector development in the electric power sector (PSDE). The results of this evaluation were presented in the World Bank publication, "Power for Development: A Review of the World Bank Group's Experience with Private participation in the Electricity Sector".

Among the top 15 electricity producers in the world, India ranks fifth with an installed capacity of over 152 Gigawatts. According to the latest figures available, the country produced 787,546,450,000 kilowatt hours of electricity in 2008, which is about 4 percent of the total power generation in the world. Only four other countries produce more electricity than India. The U.S. tops the list with a production of 4,110,259,050,000 kilowatt hours of power in 2008. The country is also the world's largest consumer of electricity. In 2007, it consumed 3,872,598,000 megawatt hours of electricity.

The U.S. is followed by China with a total electricity production of 3,221,798,270,000 kilowatt hours in 2008. Even in power consumption, China ranks second in the world. In 2009, it consumed 3,650,600,000 gigawatt hours of electricity. At 277 watts, its per capita power consumption is almost five times that of India. While Japan is in the third place with a

production of 1,009,445,000,000 kilowatt hours of electricity in 2008, Russia is the world's fourth largest producer of electricity with a production of 982,998,790,000 kilowatt hours of electricity in 2008.

Russians consume 840,380,000 Gigawatt hours of electricity making them the fourth highest users of power. On the other hand, Japan's total electricity consumption in 2008 was 1,007,067,000 gigawatt hours. The other countries that are there in the list include Canada, Germany, France, Brazil, South Korea, UK, Italy, Spain, Australia and Maxico. Despite the fact that India has the fifth largest electricity-generation capacity in the world, the country is still facing major power crisis. While most of the Indian villages do not have electricity, all most all Indian cities suffer daily power cuts. Although India is the world's fifth largest consumer of electricity, the country has amongst the lower per capita power consumption rates in the world. Only Ethiopia, Afghanistan, Congo, Bangladesh, Kenya, Pakistan, Myanmar, Sudan, Cameroon, Nepal and some other sub-Saharan countries have lower power consumption than India.

Competition in electricity supply is still in its infancy in India and similar was the condition of United Kingdom in 1990 when in England and wales a daily spot market known as electricity pool was created which was administered by National grid company (NGC).Each morning the competing generating companies would submit bids for their various generating sets to NGC for the following days operation. Each bid included an offer price at which the generating company would be prepared to operate its various generating units for the following day. Once the generators had submitted their bids to the pool the NGC examined its own demand forecast for the following day and ranked each generating unit in the order of price (lowest price first) ,The final schedule was published at 15 hrs so that generating units were notified. As there was often considerable overcapacity in the system any generating unit for which the offer price was too high were either placed on standby or forced from the pool to excluded and shutdown. As electricity cannot be store it is essential that the controllers of the transmission grid be able to bring online additional generation capacity at very short notice. It led to the condition of varying pool price which reflected the demand on transmission grid.

Since inception, the electricity industry in the USA was treated as a natural monopoly and accordingly was subject to regulation primarily by individual states. The sector was characterized by vertically integrated private Investor Owned Utilities (IOUs) owning the entire generation, transmission and distribution assets in the area of their operation. The federal involvement was limited to oversight of interstate transmission and wholesale trading through the Federal Electricity Regulatory Commission (FERC).

The reform effort in South Korea's electricity sector problems have been analyzed by John Byrne, et. al. (2004) including power liberalization strategy relating to economic, political, social and environmental contradictions of the country. South Korea's economic miracle was founded on a rapidly expanding electricity sector, using a model termed as 'synergistic development,' in which electricity and economic growth are regarded as mutually reinforcing imperatives of modernization. A legacy of the model has been high public sector debt, extensive use of nuclear energy, high environmental costs, and low public accountability. During its 35-year pursuit of synergistic development, South Korea was transformed socially and politically, replacing a military dictatorship with a democracy and evolving an active civil society, while becoming integrated into the global economy. When the Asian economic crisis hit South Korea in 1997, the electricity sector's financial vulnerability was exposed and structural adjustment measures were demanded by the international financial community. In response, South Korea revised its development model, embracing a neoliberal reform programme termed as 'harmonized development.' The liberalization and privatization plan was of unusual scope and ambition. But by June 2004, the government had lost confidence in the ideal of harmonization and halted the sector's privatization.

Pakistani electrical power sector has been described by Ijlal Naqvi (2012) regarding Governance and Development that indicates the Pakistani power crisis in a larger context of continuity through periods of dictatorship to democracy and suggests how efforts can be made to make state service delivery more responsive to citizens that might be reconceived. A historical review of the Pakistani power sector establishes first and foremost that the crisis is the product of longer-term processes for which the policy solutions currently being proposed (with the support of international donors and multilateral lenders) are inadequate. Depoliticized attempts at power sector reform have little to offer in light of the pervasively informal and

negotiated nature of the fragmented Pakistani state.The institutions of power sector governance are mutually constituted by the formal rules and the informal--personal relationships, language, money violence and power. These rules of the game are as relevant to relations within and between public sector organizations as they are to the engagement of citizens with their state.

The same rules apply at the margins of the state--informal squatter settlements--as at the core, though the resources brought to bear and the resultant outcomes are different. The internal incoherence of this state underscores the limitations of formal rules in determining outcomes, and the poor prospects for reform efforts that focus exclusively on the formal aspects of governance. To proactively engage with the question of political will, leads away from top-down policy perspectives and counter to the depoliticizing tendencies that currently shape policy reforms. Instead, an energized and informed local participation can be a counterweight to the inertial tendencies of a Pakistani state whose reforms tend to be co-opted by existing power centers rather than result in changed outcomes'

The Electricity sector in India is at the forefront of the worldwide trend of growing private participation in infrastructure. Although sixty-two developing countries have made at least some progress in introducing private participation in electricity, the breadth and depth of the private participation remain uneven. The most successful countries have been those that have found the political will to abandon a long history of subsidized tariffs and to establish regulatory frameworks that offer credible commitments to investors. The sustainability of forms of private participation that do not involve these elements is being tested in some countries in Asia, where recent experiences should provide important lessons for countries that are at an earlier stage in framing their private participation strategies.

While it is easy to state that competition in the energy market is a desirable thing, in practice it is difficult to achieve a truly competitive market among utility companies. Utility networks, be the gas or electricity, lend themselves to monopolies and are not naturally suited to competition. This is because it is impractical and prohibitively expensive to construct two or more set of competing transmission / distribution network.

The duel objectives of power sector reforms in India, improving efficiency and attracting private investment, are far from being achieved. It is commonly acknowledged that competition in the sector can help achieve the objectives of the reforms, but although the Electricity Act of 2003 promised to usher in competition, after several years of its enactment

there is very little competition in generation and absolutely no competition in retail supply. The introduction of competition in the power sector in India by private sector participation is expected to be drawing upon the US model of deregulating generation and retail supply whilst simultaneously keeping transmission and distribution under regulation.

1.6 Power generation in Uttar Pradesh

The State of Uttar Pradesh (U.P.) with a population of more than 200 million people is India's most populous state. In the past, the Government could not manage its public expenditure well and often utilized borrowings to meet recurring and un-remunerative expenditure, leading to a mounting debt burden. Development expenditure was crowded out by poorly targeted subsidies, stagnating revenues, and rising salary and interest costs. Average budgetary support over the past few years, from the Government of Uttar Pradesh to Uttar Pradesh State Electricity Board (UPSEB), has been about 1 percent of the Gross State Domestic Product (GSDP).

The Government of Uttar Pradesh announced it's a power sector reform policy statement in January 1999. The objective of this policy was to restore the credit worthiness of the power sector and to create an environment which will attract private investments, promote competition and efficiency and facilitate sustainable development of power sector.

The aim of the reform programs of the State Government of Uttar Pradesh was to withdraw from the power sector as owner, operator & regulator of the utilities and to have commercially operated utilities functioning in a competitive and appropriately regulated power market. Restructuring and unbundling of U.P. State Electricity Board has been done while segregating power generation, transmission and distribution functions into autonomous and separately accountable entities, through transfer of assets, liabilities and personnel. By establishing an independent regulatory Body, UP Electricity Regulatory Commission (UPERC), Power Sector in U.P. started functioning under regulated regime since June 1999. UPSEB was unbundled in January 2000 into three Corporations i.e. U.P. Power Corporation limited (UPPCL), Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited (UPRVUNL) & Uttar

Pradesh Jal Vidyut Nigam Limited (UPJVNL). Different Corporations started functioning commercially.

1) Uttar Pradesh Power Corporation Limited (UPPCL), which is responsible for transmission and distribution of electricity in Uttar Pradesh.
2) Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited (UPRVUNL) which owns and operates the existing thermal power stations of UPSEB.
3) Uttar Pradesh Jal Vidyut Nigam Limited (UPJVNL) which in addition to their own small hydro power houses owns and operates the existing and under construction hydro power stations of UPSEB.

The U.P. Power Sector reforms are being done keeping in view the following goals. The electricity will be supplied under the most efficient conditions in terms of cost and quality to support the economic development of the state of Uttar Pradesh. Protection of interest of consumers is also being tried to be assured. The Corporatization and Commercialization of new emerging entities is being done in phased manner. Promotion of private sector participation in power generation privatizes distribution business also in phases. Tariff reform is being done with the objective to rationalize tariff for full cost recovery and minimize cross subsidy.

UPERC established in September, 1998 under Electricity Regulatory Commissions Act, 1998 of Govt. of India (and is deemed to be set-up under UP Electricity Reforms Act, 1999). The prime objective of UPERC is to create a regulatory environment to promote transparency, efficiency and economy in the operations and management of the power utilities, and to encourage competition and help UP to attract private capital for the power sector development while appropriately safeguarding the interests of the consumers. The main functions of UPERC are as following:

i. Determine the tariff payable for the use of the transmission facilities.
ii. Regulate power purchase and procurement process of the transmission utilities and distribution utilities including the price at which the power shall be procured

from the generating companies, generating stations or from other sources for transmission, sale distribution or supply in the State.

iii. Promote competition efficiency and economy in the activities of the electricity industry to achieve the objects and purpose of this Act.

iv. Regulate investment approval for transmission, distribution or supply of electricity to the entities operating within the State.

v. Aid and advise the State Government in matters concerning electricity generation, transmission, distribution and supply in the state.

vi. Issue license for transmission, distribution or supply of electricity and determine the conditions of the license.

vii. Regulate the working of licensees and other persons authorized or permitted to engage in the electricity industry in the State and to make their working efficient, economical and equitable;

viii. Require licensees to formula plans and schemes for the promotion of generation, transmission, distribution, supply or utilization of electricity and quality of service and to device proper power purchase and procurement process.

ix. Set standards for the electricity industry in the State including standards relating to quality, continuity and reliability or service.

x. Promote competitiveness and make avenues for participation of private sector in the electricity industry in the State, and also to ensure a fair deal to the consumers.

xi. Lay down and enforce safety standards.

xii. Aid and advise the State Government in formulating power policy for the State.

xiii. Collect and record information relating to generation, transmission, distribution or utilization of electricity,

xiv. Collect and publish data and forecasts on the demand for, and use of electricity in the State and to require the licensees to collect and publish such data.

xv. Regulate the assets, properties and interest in properties relating to the electricity industry in the State in such manner as to safeguard the public interest.

xvi. Adjudicate upon the dispute and differences between a licensee and utility or to refer the same for arbitration.

xvii. Co-ordinate with environmental regulatory agencies for evolving policies & procedures for appropriate environmental regulation of Elec. Sector in the State &

xviii. Aid and advise the State Government on any other matter referred by the State Government.

In the second phase the different Generation and Distribution companies are being horizontally divided into number of companies. These Companies will ultimately be privatized. After the establishment of the distribution companies, supply of the bulk power to the distribution companies will be made under a Bulk Supply Agreement. Over a period of time, the distribution companies may also enter into a Power Purchase Agreement directly with the generators and other bulk suppliers.

The tariff Revision, a step towards rationalization of tariff after reform, was made effective from 09th Aug 2000. Formation of Special Electricity Courts in all districts and State level Court was done with effect from 22nd October, 2000. In order to make the metering systems transparent, electronic meter were installed at all sub stations and big consumers. Energy Auditing was planned down-up to consumer level. Process of strengthening the transmission and distribution system with the help of World Bank Loan was also started.

Reforms in the energy sector were initiated to supplement the Government's efforts in the development of the sector and to make it more efficient with the help of Asian development bank and World Bank. The Government has been endeavoring to provide a policy environment that encourages free and fair competition in each element of the energy value chain and attracts capital from all sources-public and private, domestic and foreign. Encouraging such capital formation is crucial for India to meet its energy needs. Significant progress has been made in establishing independent and transparent regulatory authorities in the power sector to facilitate the rationalization of electricity tariff as well as to encourage competition while protecting the interests of all stakeholders.

The thrust of the reforms has been to deregulate the prices of commercial energy resources, increase competition through institutional, legislative and regulatory reforms and reduce subsidies.

The power sector offers a wide scope for private investment through change of ownership of existing assets or Greenfield investment in generation, transmission or distribution assets. Some of the major avenues for private participation in the sector are:

i. Partial or full divestiture of generation and distribution assets;
ii. Greenfield generation or transmission assets on merchant, build own operate (BOOT), build operate transfer (BOT), or build lease transfer(BLT) basis; and
iii. Rehabilitation of existing generation assets on build, rehabilitate, operate, and transfer.

Divestiture of generation and distribution assets is expected to bring efficiency improvement and superior management skills in the sector. However, this does not translate to capacity expansion or increased access to electricity in the immediate future. The government gains in terms of divestment funds, which can be utilized for temporarily bridging the fiscal gap. These funds can also be ploughed back to the sector or utilized for budgetary support to other social sectors.

With the upcoming reforms the Power sector ceases to be a burden to the state's budget and eventually becomes a net generator of financial resources. As per the Thermal Power generation and development policy (2008) of Government of Uttar Pradesh and in view of social uplift and economic development of the people of the India's most populous state, the government is committed to provide reliable and cost efficient power. The state has energized about 20,000 villages in 2007-08 and had plans to electrify all households by the year 2012.The demand for power in the State of Uttar Pradesh is expected to increase significantly in the years to come and to meet this demand, there is an urgent need to augment the generation capacity in the State. There have been significant efforts for capacity addition through establishment of power generation units. However the State still needs substantial additional capacity to provide adequate power in all sectors.

To meet this objective the Government of Uttar Pradesh envisages private participation in the power sector by having a policy conducive to investment by private power developers in the State.

The aims of the policy are as following.

i. To encourage investment by the private companies in Uttar Pradesh to provide a common implementation frame-work.
ii. To have a definite power sharing agreement between the State Distribution Utilities and the private power developer to augment power availability in the State by providing incentive for investment to facilitate shorter development period for Developers.

Facilitation by the Government of Uttar Pradesh for project development activities.

As regards the operative period, this policy will be applicable to the projects whose developer is identified after date of announcement of this policy that is 1st August, 2008 till 31st March, 2018 and for power plants above 250 MW. This policy is applicable for all types of thermal power plants. On the basis of Thermal Power Generation Development Policy 2008 during the Operative Period or Additional unit(s) of Projects developed at the same location during the Operative Period, where the developer has been selected through the competitive bidding process.

a) Fuel Linkages

In all cases fuel linkage for additional capacity / installed capacity under this policy will be the responsibility of the developer i.e. the developer will be entirely responsible to make his own arrangements for sourcing the fuel for the project.

As regards the Implementation Methodology, a developer desiring to establish power plant / plants under this policy will have to apply to the Energy Department of Government of Uttar Pradesh or its assignee along with a preliminary project report with details of proposed financing and fuel linkage. The Government of Uttar Pradesh shall provide its decision regarding the in-principle approval of the application within two months from the receipt of such application.

The approval of the project by Government of Uttar Pradesh will be followed by a Memorandum of Understanding (MoU) and Implementation Agreement (IA) as prescribed by the Government of Uttar Pradesh between the Developer & Government of Uttar Pradesh. The MoU would be signed within 30 days from the date of in-principle approval of the project by

the State Government. The Developer shall identify a suitable site (if not selected earlier by Government of Uttar Pradesh or its assignee) in the State of Uttar Pradesh and carry out necessary survey for availability of land for the Power Station and ash bund, source of coal, feasibility for movement of coal, water availability, power evacuation, etc.

b) Project feasibility Report

The Developer will prepare the Project Feasibility Report (PFR) within 120 days from the in-principle approval of the project by the Government of Uttar Pradesh. On receipt of the PFR from the Developer, the Energy Department, Government of Uttar Pradesh will examine various requirements and provide its in-principle acceptance to the Company.

The Implementation Agreement will include an implementation schedule proposed by the developer and accepted by the Government of Uttar Pradesh and would be signed between Developer and Government of Uttar Pradesh or its assignee within 180 days from the date of in-principle approval.

On signing the Implementation Agreement, the Developer would be permitted to proceed with the development of the Project including but not limited to land acquisition, water allocation, coal linkage, captive coal block allocation (subject to availability) and statutory and other clearances as required under the applicable Central and State laws for implementation of the Project.

c) Time frame for implementation:

The time frame for implementation, under this policy for Power plant developers is to achieve financial closure within 12 months from the date of signing of the MoU. In case of inability of the developer to meet this deadline, the developer shall seek an extension of time frame for financial closure in writing from Government of Uttar Pradesh with suitable reasons for the same. Government of Uttar Pradesh may permit or reject the same at its own discretion. In case of rejection, the power plants shall cease to be covered under this policy and will not be eligible for any support from the Government of Uttar Pradesh as applicable under the policy.

The developer has to commit a commissioning schedule of maximum 48 months from the date of signing of Implementation Agreement for the first unit of the proposed power plant

and commissioning of each subsequent unit, if applicable, within three months from the commissioning of the preceding unit of the power plant. This commissioning schedule will be part of the Implementation Agreement.

During the implementation of the project the developer shall submit progress status of the project development activities, including milestones achieved, as per Implementation Agreement, to the Energy Department Government of Uttar Pradesh on a monthly basis.

All the power plants established under this policy shall be eligible to obtain following support / co-operation from the Government of Uttar Pradesh:

d) Support from the State Government of Uttar Pradesh

The Government of Uttar Pradesh will make efforts to facilitate all incentives to the Developer that are available to industrial projects in the State as per the applicable industrial policy of the Government of Uttar Pradesh or the incentives that are offered to similar projects announced in this regard from time to time. The Government of Uttar Pradesh will also facilitate expeditious grant of permissions, approvals, no-objection certificates, recommendations, etc. under the purview of the State Government. The Developer shall be responsible to obtain all the statutory clearances/approvals including approvals relating to Foreign Direct Investment, if any, as per law.

The land requirements for the power plant under this policy would have to be identified by the developer and the Government of Uttar Pradesh shall facilitate the acquisition process of the land. However, the cost required for acquiring the land would be fully borne by the developer.

The Government of Uttar Pradesh shall facilitate and provide needed water linkages expeditiously and will assist in obtaining clearances from Centre.

The primary responsibility of development of the Project shall be of the Developer. The Energy Department, Government of Uttar Pradesh will facilitate the Project development activities by extending all possible support/co-operation to the Company.

The cost of the dedicated transmission line, if required, from the Generating Plant to the designated grid sub-station of the State utility/or inter State grid substation and the cost of interfacing at both ends (the Generating Plant and grid substation) including work at the grid Sub-Station, cost of bay, tie- line, if any, and replacement/ up gradation of existing equipment, if any, shall be borne by the developer.

The State Government through the State transmission utility or other assignees will facilitate the clearances and approvals for connecting the power plant to the grid sub-station. However, the responsibility of application, clearances and approvals for the same would lie with the developer.

The Government, the State distribution utilities or their assignees will not guarantee purchase of power from additional units by the Developer. However in the case of a project selected under the competitive bidding process in which the coal linkage for the original number of units has been provided by the Government of Uttar Pradesh, the Government shall have the first right to purchase power up to 20% (Twenty percent) of the aggregate capacity of the additional generating units which may be set up by the developer on the basis of his own arrangement for sourcing the fuel, at the rate determined by the bidding process. This condition will be applicable to capacities added by the developer within a period of two years from the commissioning of the last unit of the project supported by the coal linkage provided by the State of Uttar Pradesh.

In the case of additional capacity, for the project being setup by a developer which are commissioned more than two years after the date of commissioning of last unit of the project supported by coal linkage being provided by the State of Uttar Pradesh, the State Government or its assignee shall have the first right of refusal to purchase power up to 30% (Thirty percent) of the aggregate additional capacity from such generation units at a rate to be decided by the Uttar Pradesh Electricity Regulatory Commission.

In the case of a project being setup by a developer outside the competitive bidding process on the basis of Joint Venture/ captive with his own arrangement for sourcing of fuel for the project, the State Government or its assignee or its nominated agency shall have the first

right of refusal to purchase power up to 30% (Thirty percent) of aggregate capacity of such generating units at the rate to be decided by the Uttar Pradesh Electricity Regulatory Commission.

The right of refusal will be exercised by the Government each time the Developer is in the process of finalizing its Power Purchase Agreement (PPA). However, the Government would provide its concurrence or otherwise to the PPA to the Developer within three months of the receipt of the same. The PPA term shall be twenty-five years. The PPA shall be approved by the Uttar Pradesh Electricity Regulatory Commission. The balance power or the total power, as the case may be, may be sold to third party consumers, other licensees, traders, etc. Such sale to third party shall be guided by the applicable regulations such as Open Access Regulations, surcharge etc. issued by Uttar Pradesh Electricity Regulatory Commission.

The developers will also have to make their own arrangement for entering into a wheeling agreement with State distribution/ State transmission utilities, as may be applicable, as may be mutually agreed upon between the Developer and Licensee(s).

The Government of Uttar Pradesh will be supporting implementation of the projects would be under a special task force. The provisions of Power Policy, 2003 (as amended in June 2004) shall stand superseded in respect of Thermal Power Generation stations.

a) For attaining the goal of 'Energy for all' the following points are required to be addressed within a specified frame work and time frame
b) Improving operational efficiency of utilities
c) Enhancing financial viability of the State owned Utility/ Corporation
d) Creating adequate generation and transmission capacity
e) Increasing access to electricity and promoting the correct energy mix.
f) Creating and enabling environment investment in generation
g) Enabling efficient subsidization, both quantum and targeting.

e) Assured Returns:

Also it is worth considering that, while cost recovery is essential for the sustainable growth of the power sector (irrespective of whether investment is from private or public sources), it is important also to look at the affordability of tariffs to the population served. Countries with low per capita incomes (say below $1000) will likely have greater difficulty in raising cost recovery than those with higher per capita incomes. This poses important policy questions such as whether or not the desired level of cost recovery should vary according to per capita incomes. And also, where cost recovery has to be less than adequate, what options should be considered to ensure sustainable growth of the power sector.

Being a state-owned monopoly or a state-approved private monopoly, the power sector has traditionally harbored several inefficiencies, such as: overstaffing, lack of commercial orientation, poor availability and utilization of plant, excessive system losses and leakages. However, closer scrutiny of cost structures has not usually received serious attention even after private investors having entered the sector.

A look at the power scenario in Uttar Pradesh shows that the base load deficit has improved from 20 per cent in 2004-05 to 16 per cent in 2006-07.within the category wise consumption, industry holds a major share at 34 per cent, but the corresponding usage.of captive power is not high as only 9 per cent of the total captive capacity is present in Uttar Pradesh. Assuming these circles to be privatized through the franchisee route, it the domestic demand potential was estimated in these few circles.

Table - 1.8 Domestic potential of top circles in Uttar Pradesh

Districts	Dom total Units (mn)	Dom Potential Revenues (Rs mn)	Per cent of Total Domestic consumption in the state
First 10 circles			
Kanpur urban	**1015.1**	**1370.4**	**6.7**
Agra	**759.1**	**1024.8**	**5.0**
Muzzaffarnagar	**720.9**	**1622.0**	**4.7**
Bijnor	645.4	1452.1	4.2
Bulandshahar	530.8	1194.3	3.5
Meerut	499.1	1123.1	3.3
Firozabad	434.6	586.7	2.9
Etah	421.5	569.1	2.8
Aligarh	300.3	405.4	2.0
Mainpuri	319.9	431.9	2.1
	5646.8	9779.7	37.1
Next 10 circles			
Allahabad	**890.0**	**2705.5**	**5.8**
Gorakhpur	**761.0**	**2323.5**	**5.0**
Varanasi	**443.1**	**1347.0**	**2.9**
Deoria	371.3	1128.9	2.4
Basti	322.5	980.4	2.1
Chandauli	310.9	945.1	2.0
Banda	248.8	335.8	1.6
Mathura	231.6	312.7	1.5
Lalitpur	203.6	274.9	1.3
Etawah	186.5	251.7	1.2
	3969.3	10595.5	26.1

Source: CRISIL report (Research Outlook 2007-08 to 2011-12) : Sector : Power

The districts shown in the above table together total for Rs.20 billion of the potential domestic revenues. These districts contribute to around 63 per cent of the total domestic consumption.

Though power reforms are the most important item on the government's agenda, it often leads to face-offs between the Centre and states. Electricity is the common denominator for all technologically advanced societies. Correlation between per capita income and per capita power consumption is very strong. If the power industry is below-par, overall growth is hobbled.

Efficient and quality power supply is key to inclusive socio-economic development. With growing population and demand, it is imperative that well-defined plans and policies are laid down for proper and time-bound improvement in power scenario of the State. The Government of Uttar Pradesh has declared new Energy Policy 2009, which envisages that the per capita consumption of power would increase from the meager 370 units at present to 1,000 units by 2017. It gives renewed thrust to power generation, transmission and distribution along with simplified procedures and incentives for active private participation. The salient features of the Policy are:

The Amendment of Dec. 24, 2009: State's share in power has been scaled down from existing 90 per cent to just 50 per cent in power generated by private player if state Government made a recommendation for fuel to Union Government.

a) Industry status: all new projects will be treated as "Industry" in terms of industrial policy of the State and all the incentives available to new projects will be applicable as per the Industrial Policy of the State.
b) State shall facilitate land assembly, water linkage and necessary clearances for the project as per policy of State Govt. The land cost shall be borne by the developer.
c) Sale of power to third party: Fifty percent of additional power will be allowed for third party sale in the case of optimized capacity of existing plants or the plants under commissioning.
d) Private participation in renovation, modernization and Management of existing power plants through Lease, Rehabilitate, Operate and Transfer

T-8608

e) Sale of existing plants to private sector or to any joint sector ventures for new capacity installation at old site.

f) Encouragement to setting up of Co-generation plants based on bagasse / bio-mass or any other non-conventional fuel. These plants will be able to use conventional fuel during off season. Of which 50 % would be allowed to be sold under open access system. While plants based on bagasse or bio-mass will be allowed to sell 10% of their total generation.

g) Encouragement to private participation in Transmission to attract the necessary investments for strengthening and expansion of the Transmission system.

h) Transmission licensees in the private sector would be encouraged and grant right of way on conditions similar to being granted for state owned Transmission Company

i) Private sector participation in both rural and urban area distribution business through a transparent competitive process.

j) Transition period support to the distribution entities to ensure a successful turnaround of the State power sector.

k) Grant of open access on the existing State owned transmission network.

l) Encouragement to renewable energy projects based on bio-mass, solar energy, municipal sewage, solid waste and industrial waste as well as mini, micro and small hydro power projects.

Memorandum of Understanding (MOU) route:

To encourage private participation, generation projects of 250 MW and above shall be allowed to be set up through Memorandum of Understanding (MOU) route by Independent Power Producer (IPP) besides already available routes of Case-1* and Case-2** methods.

The economic development of Uttar Pradesh has been seriously hampered by inadequate availability of power. In view of the fact that the conventional sources of power are fast depleting and pose threat of environment pollution too, the challenge before the State Government is not only to meet the ever growing demand for power but also to progressively increase the share of renewable sources in the power-mix so as to achieve overall energy security.

As regards the hydropower generation policy after the creation of Uttarakhand State. U.P. is left with the limited scope of development of Hydro Electric Power due to its topography. However, the state of U.P. is endowed with rich water resources in the form of major rivers as well as extensive irrigation canal network, and it thus becomes imperative to harness available Hydro Power potential to the maximum extent possible.

The state has an estimated over all identified hydro power potential of 568MW out of which 167MW capacity comprises to small hydro power sector up to 25MW capacity which have so far been identified at 60 locations in U.P. The identification of small hydropower project (SHP) sites is in progress and more sites are expected to be identified in future by the nodal agencies NEDA/UPJVNL as well as private developers and also by any company designated by U.P. Govt.

Hydropower policy (2003) of U.P.

U.P. has considerable potential in small hydro power sector which is yet to be harnessed. With a view to maximize the utilization of small hydro power potential, a policy has been formulated to achieve following broad objectives.

a. To enhance the power availability in the state grid through the contribution of pollution free renewable energy for socio economic development.
b. To supplement minimum rural energy needs through sustainable small hydro power schemes.
c. To provide power for industrial development in areas contiguous to small hydro power sites.
d. To create conditions conducive for proactive involvement of private investor in development of small hydro power to create direct and indirect employment opportunities for the youth in state.

e. To frame guidelines for allotment of new SHP sites to be set-up in Private Sector and to enumerate various incentives and procedural facilities to attract, encourage and facilitate private sector participation in this area.

In a recent announcement (Aug 2012) four hydropower projects with a combined capacity of 3,400 KW would be set up in Uttar Pradesh in three years, the state government of Uttar Pradesh has said.

An empowered committee headed by Infrastructure & Industrial Development Commissioner approved the successful bidders for setting up the new small hydropower projects (SHPs).The projects will be constructed through the public-private partnership mode. The SHPs will be in Kutubpur (550 KW) and Dhakauli (300 KW) in Meerut, Betwa-1 (1800 KW) in Jhansi and Akbarpur (750 KW) in Bulandshahar. AMR Power has won the bid for the Akbarpur and Kutubpur SHPs and Oasis Contractors & Consultants for the Betwa-1 and Dhakauli SHPs.As per Infrastructure & Industrial Development Commissioner "The government is keen to augment power availability from all resources available, including hydropower," The Energy Task Force and state cabinet will give the final nod to the projects. Then, the lowest tariffs quoted will be referred to the Uttar Pradesh Electricity Regulatory Commission for adoption and permission to issue Letters of Intent to the project developers.

Solar Power policy (2012) of U.P.

The State of Uttar Pradesh is endowed with vast potential of solar power and the Government is keen to tap this resource to improve the availability of power in the State by promoting the establishment of solar energy based power projects, both grid- connected and off-grid type. For the attainment of this goal, a comprehensive policy framework is an imperative requirement.

Therefore, the Government of Uttar Pradesh adopts and announces **the Solar Power Policy (2012)** with the policy aims at achieving the following objectives:

a To promote generation and use of clean and green power in the State by harnessing solar energy.

b To put in place an appropriate investment climate which could stimulate private sector participation in development of solar power

c To spread environmental awareness among the general public.

d To contribute to productive use of wastelands

e To enhance skills and create employment opportunities.

f To promote establishment of local manufacturing facilities.

g To build capacity in the State to initiate and sustain, use and effective management of newer technologies.

This policy comes into effect from the date of issuance and shall remain in operation up to 31st March 2017. Solar power plants approved, installed and commissioned during this period alone shall be eligible for benefits of this policy.

Chapter – 2

Survey of literature

The Government of India announced the policy of liberalization in 1991 and consequent amendments in Electricity (Supply) Act, have opened new vistas to involve private efforts and investments in Power generation industry. Considerable emphasis has been placed on attracting private investment and the major policy changes have been announced by the Government in this regard and State Electricity Boards (SEBs) were subsequently unbundled in most of the states making them state corporations.

The literature review conducted here has been taken in the above perspective and thus the papers relating to that are mostly of post 1991 era for Indian context, however the case of other developing countries have been accordingly taken as per their respective years of sectoral reforms and private sector participation in those countries. The literature review focuses upon the following aspects in the context of the Research work.

a. Need of private sector participation in power generation

b. Drivers of private sector participation in power generation

c. Sustainability of private sector power projects

d. Availability of resources for capacity addition

e. Privatization in various developed and developing countries

f. Research Gap

2.1 Need for Private Sector Participation in Power Generation

Tongia Rahul (2003) has described the political aspects of the Indian economy with special reference to power sector. After independence the Indian economy followed a socialist path, with the state assuming an ever-larger role in economic activity. In the power sector, the central government created State Electricity Boards (SEBs) that gradually assumed responsibility for nearly all power activities in the country. A handful of power companies continue today as private electricity suppliers for several major cities including Ahmedabad,

Kolkata and Mumbai. However, the vast majority of the private entities were amalgamated after independence into state-owned enterprises.

Balachandra (2006) has discussed the implications of such private sector participation in power generation on various stakeholders, viz., public utilities, consumers and private sector. The study attempts to analyze issues like planned rationing, guarantees to private sector, backing down of existing capacity. Using the State of Karnataka (in Southern India) as a case study, the paper has developed multiple scenarios using an integrated mixed integer-programming model. The results show the advantage of marginal non-supply (rationing) of electricity in terms of achieving overall effective supply demand matching as well as providing economic benefits to the state that could be generated through cost savings.

Puneet Chitkara, et.al. , (2001) have stated that there is a general opinion that the reforms should start with privatization of Power generation. Others believe that the government has started at the wrong end by not beginning the reform process with privatization of distribution. This has to be seen from a view that this should not form a vicious circle. If the government privatizes generation without improving revenue collection, the generators have to take into account highly risky cash inflows, and would typically insist upon ESCROW/state guarantees. If distribution is privatized it will have to bear significant supply risk because of the current poor state power generation in various states. A possible solution is to let the same entity own power generation as well as power distribution.

Waquar Ahmed (2007) has examined the evolution of electric-power policy in India adopting a political-economy approach by drawing linkages between global and local/national discourses, of development. The study focuses on the objectives and goals of the post-colonial developmental state of India, and examines the transition of India's electricity policy regime from Keynesianism to neoliberalism. He has argued that the historically dynamic nature of state-society coalition in India, representing varying social and spatial interests, has impacted India's power policy. In addition, he further adds that even as neoliberalism at the global level is pushed forth under the rhetoric of free market, global corporations, in collaboration with Global Governance Institutions, demand guarantee of profits and incentives from local/national governments that violate the principle of free competition.

Dubash Navroz K. and Sudhir Chella Rajan (2001), have provided an analysis of the social and political context in which power sector reforms have taken place in India. They have focused on the character and effects of those reforms and the roles and responses of different players. The authors have tried to place these issues within their institutional context and examine the extent to which the political interests shaping the reform agenda have addressed public benefits that includes pricing of electricity, expanding services to rural areas and environmental dimensions of providing electricity. They have also placed emphasis on the governance processes necessary to achieve these objectives.

Woods Laura (2011) has highlighted the Major Opportunities Present in Power Sector .The Indian Power Sector is undergoing a rapid growth phase with a vision to provide reliable, affordable and quality power for all by 2012. The demand for power is growing exponentially in accordance with the high level of developments in the infrastructure sector pertaining to progress in telecommunication, roads, airports and ports. However, in the past few years' policy makers and regulators have taken their stand in order to accelerate the growth of power sector leading to capacity additions in generation, transmission and distribution, stable regulatory environment coupled with focus on rural electrification, nuclear and renewable sources of energy. There is immense scope for further investment in the sector, both from domestic and international.

T L Shankar (2004) writes that in subsidizing power to agricultural machinery (such as pump sets etc.), the correct procedure would be to separate out small and marginal farmers and supply them with least expensive power. But the data is not available to do so.

As per the article 'Indian Power Sector in Transition Mode' P.P.Basistha revealed (published by Athena Information Solutions Pvt. Ltd) that it needs to be reinstated that the government, the power project developers and the other stakeholders in the Indian power sector will have to address numerous issues through concerted efforts both for mid and long-term, if India will have to attain its mammoth power capacity addition of 85,000 MW during the twelfth plan period (2012-17) so as to realize GDP growth of over 7 percent during the period. According to industry insiders, given the ongoing intention of the government to materialize higher GDP growth, shortages in slippage are likely to happen due to persisting

multiple issues, requiring intervention by the government and also by the private project developers by putting its act together.

The Department of Economic Affairs, Government of India (2009) has summarized the policy initiatives to encourage private participation. To attract large scale private investment, the Central Government has taken a number of steps including the private sector to set up coal, gas or liquid based thermal, hydel, wind or solar projects with foreign equity participation up to 100% under the automatic route. The bulwarks of the new policy framework are the Electricity Act, 2003, National Electricity Policy 2006, Tariff Policy 2006, Rural Electrification Policy 2006, New Hydro policy 2008 and Mega Power Projects 2008. In addition, the Central Government has notified the National Load Dispatch Centre Rules, 2004. Further, the Central Electricity Regulatory Commission (CERC) has notified several important regulations including the regulations on tariff, open access in transmission and licensing of transmission service providers and traders and the Indian Electricity Grid Code, 2006. The Appellate Tribunal for Electricity was set up in 2004 to hear appeals from Central and State Electricity Regulatory Commissions.

In line with the schemes formulated by the Government of India for attracting private developers towards Non-Conventional Energy Sources, the various state governments have formulated the policy guidelines for promotional and fiscal incentives to encourage private developers and entrepreneurs for developing non-conventional energy sources.

The Indian power sector is characterized by a shortage of power supply. Northern region remains the most potential area for installed power with maximum shortfalls followed by Southern region. This provides an opportunity to bridge demand-supply gap in the Indian power sector. the demand driven power sector will boost private investment especially merchant power plants. In addition, renewable power will remain a favorite investment avenue as more than 80% renewable power is generated by private players.

As per report of Department of Energy , Government of Assam the state has a hydropower potential of the order of 541 MW (2007) against which only about 2.00 MW has been harnessed so far from the Bordikharu Small Hydropower Project (that remained inoperative since April' 1999 due to technical snag). The Government of Assam has decided to

encourage generation of power through small hydropower (SHP) sources of energy and has framed a policy so that the development of this sector serves as an engine to achieve the objective of promoting the all-round development of the region by inducting private participation.

The Government of Gujarat is keen on development of renewable energy sector as well, given the dwindling resources of fossil fuels, increased threat of global warming and the concern on environmental protection. The state is blessed with long coast line and good wind speeds for harnessing of the Wind Energy. The State of Gujarat is committed to have investment in Clean and Green Energy to reduce Carbon Dioxide emissions.

The Government of Bihar has a policy for active promotion of private entrepreneurs in the areas of power generation and distribution. Therefore, with a view to encouraging private sector participation in decentralized generation of grid grade level power, through utilization of the available inputs of renewable and non-conventional sources of energy like solar, wind, water, biomass and other wastes.

The Jharkhand Government has a policy to encourage private sector participation in generation and distribution of power. The distribution of power in industrial areas and major cities of the State like Ranchi, Jamshedpur and Dhanbad are being contemplated for privatization.

Chhattishgarh government in its policy directives (2002) have announced that every unit, organization or private agency desirous of installing power generating unit based on non-conventional resources (like Mini/ Micro, Hydel Projects, Wind Energy, Bio Energy, Solar Energy etc.) in Chhattisgarh shall be eligible for incentives

The State Government of Haryana has taken strong steps for creating conditions conducive for the involvement of private sector or public –private sector participation in Renewable Energy Sources based power projects in the State. The State Govt. aims to achieve a minimum of 10% (i.e. 500 MW) of the total capacity addition of 5000 MW of conventional power to be generated through Renewable Energy Power Projects by 2012 as per Ministry of Non-conventional Energy Sources, Govt. of India's policy.

The Government of Himachal Pradesh has been laying the desired thrust for encouraging generation of power through renewable energy sources as well as the SHPs including and up to a capacity of 5 MW through an agency called "HIMURJA". Government of Himachal Pradesh to harness and effectively utilize the other renewable sources of energy has encouraged conducive conditions for involvement of private investors in the small hydro and renewable energy Projects

According to a report by Indian Chambers of Commerce (2010) regarding the North eastern states , going forward the eastern and north eastern belt of the country would certainly become the major supplier of power to rest of the country as these regions has abandon coal reserves and huge hydro potential. The region also has the geographical advantage to make up any deficit through imports form the neighboring countries.

According to a report (2003) of Govt. of Rajasthan the state there has been encouraging growth in development of wind power projects in the State in the recent past, primarily due to prevailing incentives and benefits offered in the afore-mentioned Policies.

The Government of Rajasthan has enforced the Policy for Promotion of Private Sector Investment for setting up of Power Generation to meet the growing demand for electricity and for rapid economic development of the state (2005). Various concessions and assistance will be provided to the private entrepreneurs setting up thermal projects of 125 MW and above capacity within the State (except captive power plants) such as Land ,water stamp duty ,taxes besides making systems simple such as single window clearance ,generation tariff and state government guarantee.

The private sector power plant would be able to sell power to the State Electricity Board or to supply directly to bulk consumers and units in their designated load areas. It shall also be able to sell power to any grid or export power outside the state with the concurrence of the State Electricity Board. Thus, it is intended to provide wheeling and banking of power through the transmission and distribution system of the State Electricity Board.

According to a report by the Government of Uttar Pradesh (2009) the State Government has declared the Energy Policy, which envisages that the per capita consumption of power would increase from the meager 370 units at present to 1,000 units by 2017. Efficient and

quality power supply is key to inclusive socio-economic development. With burgeoning population and demand, it is imperative that well-defined plans and policies are laid down for proper and time-bound improvement in power scenario of the State. It gives renewed thrust to power generation, transmission and distribution along with simplified procedures and incentives for active private participation.

In view of the above authors the main role of the government is to form policies and appoint regulators to provide a level playing field for all the player of power sector who are involved in the value chain of power generation upto distribution to end consumers. The key concept of economic viability and open market competition should be there to promote private sector participation. It is emphasized that the beginning of the reform process should start with privatization of distribution. It has also been advocated by many authors to integrate the concept of free market, market driven price mechanism and assured returns to investor to make it viable to have encouraging private sector participation. In view of the Indian Power Sector undergoing a rapid growth phase with a vision to provide reliable, affordable and quality power for all the participation of private sector can significantly improve the condition of the power sector infrastructure and can help achieving overall objective of effective power supply as well as providing economic benefits to the state that could be generated through cost competitiveness in the free market dynamics.

2.2 Drivers of Private Sector Participation in Power Generation

Desai Vishvanath V. (2004) has reviewed the obstacles to private sector participation in India in power generation Industry. Desai has identified that there are several factors that have acted upon as obstacles to private investment in the power sector. For example, the various reforms as discussed were not introduced all at one time, but in bits and pieces over a period of time, which may have diluted their impact on investors. Improvement in administrative and bureaucratic structures has not been commensurate with the spirit and pace of reforms. Improvements such as, simplification of procedures, reduction in administrative delays, elimination of multiplicity of clearances and approvals, adoption of a business-orientation, have been slow to develop and may have dragged down the impact of reforms. The controversy surrounding the Enron project may have also adversely affected investor

sentiment. Besides these factors, it is important to recognize that perhaps the most severe obstacle to private investment in the power sector has been its lack of financial viability.

Niranjan Swain, et al. (2004), have discussed the various inhibitors to growth in power sector but the major roadblock in the growth path, which made it difficult or rather impossible for a private player to enter is the Government Policy. Further the lack of knowledge and experience of Indian entrepreneurs as they didn't have enough knowledge and experience in developing power projects further aggravated the situation and made the things worse. The SEBs and other Government Agencies became financially weak and could not propel any future expansion or growth in the sector. Electricity Act, 2003 was a major step in solving the above underlying problems of the power sector. A whole new system was evolved where private players were invited to be an active participant. The system primarily demanded financial, political and other infrastructural growth (particularly in roads and communication). Some of the bold steps taken in the Act were separating power generation and distribution out of 'License Raj' regime, opening access to national grid and demolishing the 'Single Buyer' model.

Niranjan Swain (2004) further stated that the primary lesson in keeping the power sector under tight government regime was to have proper access, equity and distribution of power to various sections of society. The socialist dream did not materialize as the above benefits have not reached the general population (A significant fraction of the population particularly the rural India does not have access to electricity). At the same time, some consumer categories, not necessarily the poorest, are given subsidized electricity. Benefits are skewed in favor of certain categories of consumers (e.g., in agriculture the consumption is almost one third of total power consumption in India, yet agriculture provides less than 5% of the total revenues.

Antonette D'Sa, et. al. (1999) have critically examined the various aspects of private sector participation in India's Power Sector .They report that Independent power producers (IPPs) claim that their progress has been hindered by problems such as litigation, financial arrangements, and obtaining clearances and fuel supply agreements. On the other hand they found that, the State Electricity Boards have been burdened by power purchase agreements (PPAs) that favor the IPPs with such clauses as availability payment irrespective of plant

utilization, tariffs reflecting high capital costs and returns on equity, etc. The process of inviting private participation in the power sector and the problems experienced seem to have spurred on the restructuring of the power sector, including the formation of Central and State Electricity Regulatory Commissions.

As reported by Antonette D'Sa, et. al, additions to the generation capacity without corresponding improvement of the transmission and distribution facilities are likely to further undermine the system efficiency. The problems of private producers are various, which includes Litigation/renegotiation leading to delays, financing problems, risk sharing (construction risk, market risk, fuel-supply risk, exchange fluctuation risk) obtaining clearances & environmental problems.

Ernst &Young (2012) undertook a survey of various sectors to determine the overall outlook for India which turned out to be remains positive. However, it was found through the survey that inadequate infrastructure and a lack of governance and transparency were the major obstacles to investment in power sector. The report concludes that by improving upon these obstacles will result in an improvement in India's attractiveness for investment. The Government, though sensitive to the challenges, has to hasten policy-making and implementation, so that India continues to remain attractive.

The Shunglu committee appointed by the Prime Minister submitted a report to the Planning Commission on July 25th 2011 and highlighted the fact that all is not well in the appointment and functioning of the State regulators. The functioning of state regulators has come under a lot of criticism lately because of the mounting discom losses and inability to supply power to the consumers who are ready to pay the price for it. It is noteworthy that the independence of the regulator (CERC / SERCs) is one of the pillars of Electricity Act which lays the foundation of power sector reforms in India. This independence and autonomy is reportedly being diluted by the State Governments for various political reasons.

Nakul Korrea (1999) in Unbundling and Deregulating Electric Power in Tamil Nadu India writes Unbundling combined with deregulation has been very successful in significantly improving the efficiency of the power sector in those countries that have done it. The primary advantage of this method is that by deregulating to open competition, the industry functions at

much higher levels of efficiency. This is particularly important in a developing country like India with severe demands on its capital. Efficiency gains in the power sector result in lower prices for consumers and, because electricity is a core input to all sectors, significant gains for the economy as a whole.

Pillai N. Vijayamohanan (2008) in a review of Kerala has emphasized the adoption of reform steps undertaken by other states which may be helpful in organizing power sector reforms in Kerala. Radical policy changes were legislated in India and so far 13 States have reorganized their power sector. In Orissa, Delhi and Noida in Uttar Pradesh the power distribution was entirely privatized. Kerala with a militant trade union presence has so far been dragging her feet, even in the face of the stern legislative requirement, portending an ultimate surrender.

In a report of Asian Development Bank (ADB) Institute (2007) it has been inferred that the basket of choice available to private investors depends on the privatization / investment liberalization process adopted by the respective governments. There is wide variation in the mode of private privatization among various countries. Divestiture of generation and distribution assets is expected to bring efficiency improvement and superior management skills in the sector. However, this does not translate to capacity expansion or increased access to electricity in the immediate future. The government gains in terms of divestment funds, which can be utilized for temporarily bridging the fiscal gap. These funds can also be ploughed back to the sector or utilized for budgetary support to other social sectors.

According to, Research and Markets Adds Report (2012) Power generation costs are the key to determining the best generation mix for a reliable supply of electricity while making it available for use economically. With an increasing demand for power for economic development, countries around the world need to evaluate the present and future costs of generating electricity using the presently available and future power generation technologies. Evaluating the cost of power generation depends on various factors that are responsible for driving the prices of electricity. The most important factors driving the power generation costs are government policies and incentives, capital (investment cost), fuel costs, operations and maintenance cost.

According to a Report by FICCI (2002), the Indian private sector has already acquired capabilities for participating in nuclear power projects· Private sector investors should be allowed to have majority ownership in power projects, the industry forum said. This will boost private investment in nuclear power sector. The country has the potential to generate 60,000 MW of nuclear power over the next 25 years, which needs an investment of over $100 billion. The government is already vetting 10 nuclear power projects. Companies like National Thermal Power Corp (NTPC), Reliance Energy, Tata Power, Larsen and Toubro, and Bharat Heavy Electricals Ltd can now look forward to working as partners with international companies like General Electric, Westinghouse, Areva and Atomstroy in the field of nuclear energy generation.

The most important aspect of sectoral reform is that, the various reforms as mentioned were not introduced all at one time, but in bits and pieces over a period of time, which should have been introduced in a single ambit to get the desired results. Although the Electricity Act, 2003 was a major step in solving the above underlying problems of the power sector and an entire new system was developed where private players were requested to be an active participant. Some of the bold steps taken in the Act were separating power generation and distribution. It is also being advocated that additions to the generation capacity without corresponding improvement of the transmission and distribution facilities are likely to further undermine the system efficiency and therefore a holistic approach has to be there regarding the reforms being taken in power generation. It is also worth mentioning that the problems of private producers are various, which includes Litigation/renegotiation leading to delays, financing problems, risk sharing (construction risk, market risk, fuel-supply risk, exchange fluctuation risk) obtaining clearances & environmental problems and hence the rules and laws should take into consideration all these aspect before enforcement. . As regards the improvements such as simplification of procedures, reduction in administrative delays, elimination of multiplicity of clearances and approvals, adoption of a business-orientation, have to be fast to progress the change and should not drag down the impact of reforms.

2.3 Sustainability of Private Sector Power Projects

Saraswata Mohapatra (2010) has discussed as to how the private sector can contribute to realizing the purpose of these reform initiatives. The common thread across all the people-centric solutions is a strong understanding of the root cause of the troubles and challenges faced by Indians, as the momentum for sustainability is derived from people. The solutions proposed are not limited to the provision of products and services to cater to the unmet needs of Indians from the viewpoint of consumers but to think of them as partners and allies in our fight for sustainability.The emphasis is not only on meeting the unmet needs of Indians but also to develop the market and inculcate a culture of fostering 'sustainability'. In many of the areas proposed, the government initiatives and programmes have been mentioned in order to convey the commitment of the government in the said area, for in a country like India, given its socio-economic realities, government's role becomes important. It acts as a booster for the private sector and acts as a catalyst to make a success out of their investment.

According to Desai Vishvanath V. (2004) the dominant sector entities, namely the SEBs, are technically insolvent. They are unable to recover the costs of power supplied and remain burdened with ever-growing commercial losses. The power market in India is essentially a single-buyer market and the SEBs are the single buyer. Private power producers are therefore required to sell power to SEBs, who lack financial resources to pay for it. Initially, private investors sought comfort by asking SEBs to create ESCROW accounts so as to 'ring fence' the revenues payable to them. However, such arrangements did not address the basic issue of inadequate cost recovery and turned out to be unsustainable. Private investors also sought comfort in guarantees from state governments, but these too proved to be of limited value given the precarious finances of the state governments themselves. This meant that private investors, most of who were interested to invest in Power generation, did not have credible counterparts to sell their output. Faced with uncertain prospects of getting paid for their supplies, private investors held back from investing in the sector, despite substantial reforms and incentives.

In view of the above it is possible that few modest sized investments may be attracted under such conditions. However, it appears unlikely that major investments would be committed by private investors when the sustainability of the power sector as a whole is far

from assured. This is so because the issue of inadequate cost recovery from subsidized consumers would remain unaddressed and as long as that continues to be the case, SEBs, who are likely to retain responsibility for the bulk of power distribution for the next several years, would continue to be financially unviable. In fact, in the absence of increased cost recovery by SEBs, accelerated liberalization of the sector could result in further deterioration of SEB finances, and in the sustainability of sector operations.

CRISIL Research in its report (2009) states that in order to enable a seamless flow of power across various regions the transmission segment needs a revamp with regards to transmission pricing method, greater private sector participation and open access in transmission and distribution (T & D).

Chandrajit Banerjee (2012) in a recent report of the Confederation of Indian Industry (CII) states that that unless the issues plaguing the power sector are urgently addressed, the aspiration for 9% growth in the 12th Plan may not materialize. Even as the Indian government draws–up ambitious plans envisaging 100 GW capacity addition in the 12^{th} five year plan period (2012-17), the country's power sector faced with multidimensional challenges. These issues are constraining growth in the power sector and may have adverse impact on the economic growth in the long run. He has further revealed that critical obstacles including fuel supply bottlenecks, distribution losses and lack of funding are essential for achieving double digit GDP growth.

The planning commission in its annual report has reviewed the working of state power utilities and Electricity Departments.

During the 1980s and early 1990s, the World Bank lending had been influenced by what is known as the 'Washington consensuses'. According to this, the development processes were hindered less by capital shortages, and more by economic policies that hindered market forces. The Bank, therefore, began approaching privatization as a serious policy option. The World Bank, incidentally, had assisted various power sector projects, especially at the time the NTPC was set up in 1974. It is felt that the World Bank was interested in the creation of the NTPC because the Bank felt that their loans were better assured as the NTPC projects were expected to be better managed as compared to SEB projects. Over time, however, the World Bank was desirous of moving away from generation because of environmental issues. Since

coal was the primary fuel for power generation which gave rise to environmental de-gradation, the Bank wanted to support projects which envisaged restructuring of the sector, in terms of reforms.

A R Sihag et al (2002) , have observed that the focus of Indian reform legislation has been more on improving financial viability of the ailing power sector than on improving access to electricity. The legislation does not explicitly spell out the provisions for the extension of electricity services to the poor and the need and mechanism for subsidizing marginalized consumers. In contrast, the Philippines legislation has provision of lifeline rates for the poor and the approach to cross-subsidy, subsidy and the expansion of network. The Act stipulates a definite time frame for the elimination of cross-subsidy and at the same time it ensures subsidized rates for the identified poor.

These authors emphasize upon the need to have a proactive legislation that addresses issues linked to access to reliable and affordable sources of electricity. To effectively meet the electricity needs of the poor, legislative and policy support for mechanisms like the provision of lifeline rates and special functions like missionary electrification needs to be put in place.

According to Santhakumar et. al. (2003) the costs and benefits of power sector reform include (a) The subsidy the households currently receive for the consumption of electricity, which may be reduced as part of the reform, and this is a likely cost of the reform and (b) The losses due to the poor quality of electricity supply, which can be improved as an outcome of reform, and hence it can be taken as a likely benefit of reform. In addition, households might also perceive the indirect losses on account of the non-viability and inefficiency of the power sector (due to their impact on industrial, economic and employment growth, and also the consequent fiscal problems of the State) in the pre-reform stage. Avoiding or reducing such indirect losses can also be reckoned as another benefit of power sector reforms for the households.

Santhakumar V. et. al. (2003) have concluded that factors that facilitate/discourage power sector reforms, are very important also in the context of assessing Indian economic reforms. The public utilities in power sector are the single largest contributor of fiscal deficits in the country and the efforts to change the situation have not been very successful so far.

Reducing fiscal deficits and reforming power sector are major items of the unfinished agenda of Indian economic reforms. Thus there is a need to analyze the reasons that make power sector reforms a politically intractable issue in the country. Their study attempts to analyze how social support for reforms depends on the variables that have a bearing on the costs and benefits for different households due to power sector reforms.

ICRA in its report (2011) has mentioned that the risk profile of private IPPs have increased appreciably over the last few years. These include , vastly increased fuel supply risks, exposure to volatility in merchant tariffs, preference to Case-I bidding by distribution companies (discoms), Upward pressure on tariffs that would impact the viability of competitively bid projects, exposure to execution, regulatory and geo-political risks in case of coal assets acquired abroad, Financial position of state distribution companies (discoms) remains weak resulting in high counterparty credit risks and high leveraging levels for many of private IPPs to remain high due to phase wise investment.

D & B (2010) in its report on India's Energy Sector has discussed the regulatory requirements of the sector. The regulatory system was not effective in the power sector in India before 1997. The SEBs performance was not satisfactory; they were suffering from huge financial and commercial losses; there was no regulatory body to regulate the functioning of SEBs and regulations were not addressing core issues like consumer interest, supply of reasonable power, and quality of power. The sector was facing an urgent need of regulatory bodies, which would regulate the sector efficiently. Therefore, in order to make competitive, transparent, and consumer-friendly environment, an independent Central Electricity Regulatory Commission (CERC) at the Centre and independent State Electricity Regulatory Commission (SERC) at the state level were considered as the need of the hour for regulating the power sector.

Dharmadhikari Sripad (2009) has critically discussed the reforms relating to hydropower projects and their implications focused on the privatization of water supply and irrigation, the creation of independent regulatory authorities in the water sector, measures like elimination of subsidies and tariffs based on full cost recovery. One important aspect that is often missed in these discussions is the privatization of hydropower projects and the changes in the legal and policy regimes enabling it. This privatization of hydropower has implications that

are as serious as privatization and commercialization of water supply. In the case of the public sector hydropower companies, when cost of generation falls during the later years of the project, this benefit will go towards lowering the average cost of production of electricity and will be passed on to the consumers. However, in case of a private developer, this benefit will go towards increasing the profits of the shareholders. In other words, a common property natural resource (water and river) is being diverted for profits of private interests.

In a compiled report of selected papers on power sector reforms (2000) Prayas group[φ] described the impact of reforms in the compendium that which states that the situation requires intense and urgent efforts on the part of the public-interest organizations to take up challenges thrown up by the reform process in general and the regulatory processes in particular.

McKinsey & Company in its report (2007), suggests that if India continues to grow at an average rate of 8 percent for the next 10 years, the country's demand for power is likely to soar from around to 315-335 GW by 2017. Four key factors will drive this demand: a) India's manufacturing sector growing faster than in past, b) residential consumption growing at 14 percent over last ten years c) the connection of 125000 villages , the grid through several programs that aspires to provide power to all by 2012 and d) the realization of demand suppressed due to load shedding.

In a report by Public Private Infrastructure advisory facility (2002) the power sector restructuring in Orissa has been critically examined , the features of which are summarized as below.

i) Industry restructuring model:

The sector structure adopted in Orissa (and chosen for implementation in other states) is based on the single-buyer model. Reform in Orissa continues to focus on noncompetitive solutions, to protect the cross-subsidies necessary (in the absence of government support) to ensure the viability of the industry. In the next stage of reform the state is expected to implement a multi-buyer model, reallocating the contracts between the generators and the Grid Corporation of Orissa to the four distribution companies.

[φ] Prayas (Energy Group) based in Pune has been working in Electricity Sector on activities including Research , information dissemination ,policy activism and regulatory interventions.

ii) Privatization strategy:

Orissa privatized distribution through the sale of assets. Its experience shows the importance of undertaking financial restructuring at the beginning of reform, which may require using privatization revenues to pay down debt. Possible options for this financial restructuring include transferring debt to the private sector, transferring debt to the public sector, and writing off debt.

iii) Regulatory framework:

Orissa's experience has shown that price setting can be undertaken by an independent regulator. It has also shown the importance in India of adopting a transparent regulatory process for price setting. But there are major concerns relating to the qualifications of the members of the electricity regulatory commission and the lack of an explicit obligation for the regulator to ensure financial viability of regulated companies.

H.K Ahuja (2010) has emphasized the need of policy making process capable of balancing both local and global aims in light of the drawbacks faced by various states in India's multi governance system. States have found several difficulties in implementing power sector reform policies designed at higher levels of governance. Such reforms can only be successful if democratic means are involved in implementing them. In this paper the author offers a

democratic solution after justifying its applicability and reliability for initiating implementing and governing power sector reforms through advanced participative techniques like social multi-criteria evaluation. This can become a true and legitimate basis for carrying out governance reforms in the power sector. This initiative of Government of India towards power reforms would remain a wishful thinking unless the issues relating to these reforms, mainly concerned with the distribution sector are not conclusively settled.

According to an analysis of the Union Budget 2012-13 undertaken by Grand Thornton it has been found that there are various problems and potentials associated with private sector participation in power generation. The expectations of the power sector relating to reforms and taxation have been emphasized in view of the terminal date of availing deduction for the undertaking generation and transmission and distribution of power such as, distribution of

T 8608

power by laying network of transmission and distribution lines, undertaking renovation or modernization of existing distribution lines etc. which expired on 31 March 2012. Considering the importance of this sector, there has been lobbying for extension of the date for availing tax benefits. In view of the pressurized margins, the sector had been expecting some avenues to access low cost funds. The sector also expected speedy and swift approvals for power projects as well as favorable implementation policies. Facing the challenges of high capital investment and interest cost, the sector expected indirect tax benefits along with concessions and exemptions for plant and equipment required to set-up solar and wind power projects as well. The industry also expected relaxation in import duty to bring down the input cost involved in buying equipment, which are mainly available in the western countries.

Sonal Patel (2012) has described that the patterns of coal trade have been shifting in recent years as demand surges in Asian countries. Whereas Japan and the European Union (EU) have long been the world's largest hard coal importers, China and India are now emerging as top importers. This surge has shifted the center of gravity in international coal trade to the Pacific Basin market, as estimates from the International Energy Agency (IEA) show. All projections are per the IEA's New Policies Scenario, which assumes cautious implementation of policy commitments and plans announced by countries around the world.

As the momentum for sustainability is derived from people, the common thread across all the people-centric solutions is a strong understanding of the root cause of the troubles and challenges faced by people of the country. The power market in India is essentially a single-buyer market and the SEBs are the single buyer. Private power producers are therefore required to sell power to SEBs, who lack financial resources to pay for it.Thus there has to be ways and means to ensure proper returns to the private sector players. In case the private sector players face uncertain prospects of getting paid for their supplies, they may held back from investing in the sector, despite substantial reforms and incentives. However it is also emphasized that the proposed solutions are not limited to the provision of making products and services to cater to the unmet needs of Indians from the viewpoint of consumers but to think of them as partners and allies in the fight for sustainability.

2.4 Availability of Resources for Capacity Addition

Ravi Krishnan et. al., (2012) have stated that' India's long-term annual economic growth rate is projected at over 7%, and the country is investing in its hydroelectric, nuclear, and renewable resources. However, the primary fuel used to produce electricity remains coal, and the government has ambitious plans to significantly increase coal-fired capacity. Those plans have been challenged by a number of unexpected factors that threaten to stifle India's economic growth. Though the projected capacity additions are an impressive objective, in reality there have been and will continue to be shortfalls in capacity additions due to a variety of factors, including fuel constraints, regulatory and tariff issues, shortages of skilled manpower and construction equipment, infrastructure issues, and bureaucratic delays in obtaining clearances and permits. Contributing to the capacity addition shortfall is a shortage in domestic coal production, price volatility for higher-quality imported coals, and limited domestic sources of natural gas. Bureaucratic and government delays associated with obtaining permits and clearances for pre-bid activities such as land acquisitions, water allocation, environmental clearances, and commercially viable power purchase agreements also contribute to power generation capacity commissioning delays and shortfalls.

Ghosh Sukanya, et al. (2001), have reviewed the future prospects of Indian thermal power sector in the perspective of the depleting coal reserves of India and the deteriorating quality of the coal. As an alternative to the critical demand for power, country planners have concentrated more on commissioning of thermal power plants. Coal happens to be the basic fuel of any thermal power plant and India had a plentiful supply of this basic raw material until recently. Unfortunately, the stock of coal in India is not unlimited. The share of coal in electricity generation declined from 98% in 1950-51 to 62.3% in 2009-10. Even then, it accounts for more than one-half of the electricity generation of the country. Coal mining in India commenced in the 18th century when much of the stock was exported to the UK due to limited requirement for thermal power in industries and in the domestic household sector. The coal industry was in the hands of private entrepreneurs. In 1923, the India Government developed a regulatory framework and in 1972-73 nationalized the coal industry.

India is the third largest coal producing country. Unfortunately, Indian coal is of poor quality with high ash content and low caloric value (i.e. gross heat of combustion). High ash

content of Indian coal (which aggravates the difficulty of removing ash before combustion) and inefficient combustion technology contribute to emission of suspendable air particles and other trace gases which are responsible for the greenhouse effect. Thus, the vicinity of thermal power house in India are highly polluted causing health hazards and damage to agriculture. In consideration of depleting stocks of quality coal, India has started importing coal from countries like Indonesia, Australia and South Africa. However, cost of imported coal is high. Moreover, the ability to continue importing coal from these countries is uncertain, as there is likely to be worldwide shortage of coal in the near future.

CRISIL (2010) in its customized research bulletin has made an overview with sector focus on Power wherein it has described the scenario that India has been a high power deficit country with the deficit rising continuously over the last few years. This rise has been due to limited capacity addition while demand continues to grow in line with economic growth. However, this scenario is likely to change in future with huge capacities expected to be commissioned especially by private sector. As it is expected that about 82 GW capacity shall be added over the period of 2010-11 to 2014-15 as compared to 33 GW of last five year. Most of these capacities will use coal as fuel. An investment of Rs 8.5 trillion is expected over the next five years. Additionally a new trend is emerging in the sector where a number of players (public and private) are focusing on backward integration to secure fuel supply.

KPMG (2010) has presented a report on Power Sector in India, which identifies few other problems of the private sector participation. While the power sector in India has witnessed a few success stories in the last few years, the road that lies ahead is dotted with innumerable challenges that result from the gaps that exist between what's planned versus what the power sector has been able to deliver. While there may be heavy dependencies on equipment suppliers and challenges around logistics and work-front availability – with the right and timely application of project management principles along the lifecycle of the project, one can strive to achieve increased project completion against baselines. Certain best practices around stakeholder management, integrated project and asset development and interdependency mapping across various entities can help improve overall project planning. Once the practical implementation challenges are recognized, various teams and people get

aligned to the overall strategy and then the delivery on the estimated plans becomes more of a reality.

In view of the total availability of natural gas in the country which is not very encouraging, the public and private sector entities have embarked upon imported coal as a means to bridge the deficit. Coal is the mainstay of the power production in India and is expected to remain so in the future. Additional power generation is likely to require incremental amount of coal transportation by Indian Railways within the country and increasing unloading at ports in India for imported coal. In both cases, India currently faces capacity shortage. Hence, a project developer has to account for and manage its logistics chain in a manner that minimizes disruption to its fuel supply.

ICRA in its report (2011) has indicated that with a strategy of providing long-term fuel security and control over coal costs, many Independent Power Producers (IPPs) have been looking at acquisition of overseas coal assets. Some of the leading private sector IPPs has acquired substantial coal assets predominantly in three countries namely, Indonesia, Australia and South Africa. The preference towards these countries has been on account of adequacy of deposits in these countries with surplus coal availability for exports, logistical advantages of proximity to India and availability of low ash coal (that is below 10%) with high calorific value.

Sonal Patel (2012) has written that the country plans to fuel its current level of gross domestic product growth of between 8% and 9% with massive power capacity additions (mostly coal –fired) over the next decade. It has commissioned an 800-MW supercritical unit in March 2012 at the first of India's government-envisioned ultra-mega power plants (UMPP). Tata Power, the country's largest integrated private utility, put online Unit 1 of the five-unit 4,000-MW Mundra UMPP in Gujarat State, just 48 months after construction began on the project. Only four projects have been awarded so far on a build, own, and operate basis. In addition to Tata's Mundra in Gujarat, three are being developed by Reliance Power: the Sasan UMPP in Madhya Pradesh, Krishnapatnam UMPP in Andhra Pradesh, and Tilaiya UMPP in Jharkhand.

The first 660-MW unit at Sasan is expected to come online in January 2013, just as the last Mundra units will be commissioned. At Krishnapatnam, however, where Reliance had planned to build six 660-MW units, work has been paused since last June. The Tilaiya project, which would also comprise six 660-MW units and is expected to come online between May 2015 and June 2017, is being built at a coal pithead (mine mouth) and has dedicated captive coal blocks—unlike the other three projects, which will rely on imported coal.

Sonal Patel (2012) has further written that Future UMPP projects may be sited in this way, or closer to ports, as India battles chronic coal shortages. Though the country has large coal reserves, domestic mining companies are struggling to keep up with demand needed to sustain its existing coal plants, which account for 55% of India's generation.

Availability of the resources are the most vital and crucial issue when it comes to the execution of such mega size projects. It is understood that the shortfalls in capacity additions due to a variety of factors, including fuel constraints, regulatory and tariff issues, shortages of skilled manpower and construction equipment, infrastructure issue and bureaucratic delays in obtaining clearances can impose problems in translating these reforms to reality. Proper planning needs to be there for timely and properly addressing such issues so as to avoid any uncertainty in the project and to control the time and cost overrun. Backward integration for fuel supply is one of the key measures for sustainability and cost competitiveness. Fuel security and backup arrangement should be in place especially for those projects where the promoters have tried to have fuel security by acquiring overseas assets. With the advent of new technology there remains always a dearth of skilled manpower which needs to be properly engaged for efficiently handling the project under the given timeline. With the increasing market size of power generating and allied equipment there seems to be a limitation in timely supply of such big size equipments which are now days being procured mostly through international competitive bidding (ICB).

2.5 Privatization in Various Developed and Developing Countries

Yin-Fang Zhang, David Parker and Colin Kirkpatrick (2008) have reviewed the electricity sector reforms in developing countries. They have found that electricity sector reforms have altered significantly the sector's market structure and institutional framework. Over the last few decades' electricity sector in both developed and developing countries have been subject to restructuring to introduce private capital and increase competition. Although the effects of such reforms in a number of the developed economies are now well documented, apart from a few case studies the experience of developing countries is less researched.

Anoop Singh et al. (2005) in a review, of private investment in power sector in developing countries have emphasized that apart from macroeconomic stability, the pace and sequencing of reforms has a strong influence on private investment in the power sector. Distribution reforms and setting up of an independent regulatory institution reduces risk for investors. A peace-meal approach to reform keeps uncertainties alive for investors and does not translate in significant investment in the sector.

Cropper Maureen L. et al. (2012) estimated the impact of restructuring on electricity generation efficiency in the Indian Thermal Power Sector. They have examined the impact of the unbundling of power generation from transmission and distribution on the operating efficiency of state-owned thermal power plants in India. Using information collected by India's Central Electricity Authority, they constructed a panel data set for thermal power plants for the years 1988–2009. They took the advantage of variation across states in the timing of reforms to examine the impact of restructuring on plant performance and thermal efficiency. The models suggest that unbundling significantly improved average annual plant availability by about 7.5 percentage points and reduced forced outages by about 4.5 percentage points in states that unbundled before 2003. Restructuring has not, however, improved thermal efficiency. This may reflect the fact that unbundling has not yet attracted independent power producers into the market in India to the extent that it has in the United States.

Philip Gray (2001), has reviewed the evidence on the extent to which private participation in developing countries have been achieved. First and foremost, private investors will only invest in infrastructure enterprises if the government gives a credible commitment to cost covering tariffs. Commitments of these kinds are far more durable than the same

undertakings given to managers of public enterprises, who have limited leverage to negotiate commitments and no effective sanction if governments succumb to populist pressures to renege. With appropriate regulatory or contractual commitments, private investors have incentives to expand services and the ability to finance the investments that expansion requires. Second, private investors face stronger incentives to ensure effective billing and collection, to control costs, and to stem technical losses, which contributes to greater resources for network expansion. Finally, unlike their public sector counterparts, private operators have stronger incentives to comply with quality standards and other regulatory obligations, as failure to do so is more likely to result in fines or other penalties.

A report on unbundling of utilities like electricity submitted by European Commission (2010) has detailed the method of unbundling with clarity on issues related to legal unbundling, functional unbundling and accounting unbundling. Within functional the report detailed the way-out based on management separation, effective decision-making rights, compliance programme and few additional measures to ensure effective functional unbundling.

Das Rasmi Ranjan (2010) writes that since inception, the electricity industry in the USA was treated as a natural monopoly and accordingly was subject to regulation primarily by individual states. The sector was characterized by vertically integrated private investor owned utilities (IOUs) owning the entire generation, transmission and distribution assets in the area of their operation. The federal involvement was limited to oversight of interstate transmission and wholesale trading through the Federal Electricity Regulatory Commission (FERC).

Bacon R. W. et.al. (2002) have revealed that the sequencing of reforms is crucial to the long-term sustainability of electric power industry in developing countries. They recommended that first; the legal and regulatory framework should be in place before privatization of the restructured power supplier. Second, major restructuring should precede the creation of private ownership rights to avoid problems with stranded assets. Third, the scope for introducing competition to the wholesale power market should be incorporated into the initial structural reforms to the power market, rather than relying only on later regulatory interventions to reduce the market power of the largest power generating companies. Fourth, the incumbent utility should not sign many long-term power off-take agreements with IPPs before it is restructured and the regulatory framework for a liberalized power market is in place. Fifth,

where cash collections fall far short of the revenues that should be collected by the incumbent power utility from power consumers—regrettably, a situation that exists in many developing countries—the priority for the privatization strategy should be to improve this performance by privatizing the distribution and supply functions first. This would help attract potential bidders for the upstream generation facilities by signaling that the distributors and suppliers would become creditworthy buyers of power from the generators.

The timing of reform is also critical, particularly relative to the electoral cycle, for the privatization of electricity generators and distributors, and for an unpopular increase in electricity tariffs needed to remove major subsidies. The success of a privatization program often depends on divesting most of the state's ownership before the government faces the next election, and this can force a compromise with long-term efficiency objectives for the sector.

Paton Celine (2012) has emphasized greater private sector participation and renewable energy development to back Moroccan Electricity Industry growth. Due to its advantageous geographic location and relatively low labor costs, Morocco has built close ties with Europe, its main trading partner. Since 1993, a privatization policy has been implemented in certain sectors, including electricity. Morocco began to privatize state-owned firms before most other Arab and African states. In critical sectors, such as electricity, the government's strategy has been to enforce public-private partnerships. Economic policies pursued, since 2003, have brought macroeconomic stability with generally low inflation, improved financial performance, and steady progress in developing the service and industrial sectors.

Harris Clive (2003) has reviewed private Participation in Infrastructure in developing countries, about the trends, Impacts and policy lessons. Many of the problems as seen relate to difficulties in sustaining cost-covering user fees for these sectors, which have a tradition of pricing below costs. They have also highlighted the challenges involved in the regulation of these sectors. Critics of the private provision of infrastructure argue that it has made services less affordable and adversely affected access by the poor to modern infrastructure services. The decline in public opinions of private provision is matched by the reduced enthusiasm of many investors in developing country infrastructure, driven in part by some disappointing experiences.

Victor David G. and Thomas C. Heller (2006) evaluates the experiences of five countries– Brazil, China, India, Mexico and South Africa – as they have shifted from state-dominated systems to schemes allowing for a larger private sector role. Having the largest power systems in their regions and among the most rapidly rising consumption of electricity in the world, these countries are the locus of massive financial investment and the effects of their power systems are increasingly felt in world fuel markets.

Kintanar Noel Eli B., et.al. (2003) have described how the Government of the Philippines continues to pursue its policy of encouraging the private sector to participate in the financing, construction, management and operation of infrastructure services and facilities in the country. Through the BOT Law, the Government has put together a portfolio of approximately US$ 25 billion in infrastructure projects involving private sector investments. A number of these are big- ticket transport projects which could not be funded solely from government coffers in view of the magnitude of the capital investments required. To ensure the steady promotion of infrastructure projects that are ready for private sector investments, the Government established the Build-Operate- Transfer Center (BOT Center), whose mandate is to find technical, legal, financial, economic and institutional solutions to help government implementing agencies to make BOT projects work.

Izaguirre Ada Kannza (1997) writes that, over the past decade a growing number of developing countries have opened their electricity industries to the private sector. The new wave of policy reforms designed to promote private participation has been driven by three main forces: the need to expand the capacity or increase the reliability of systems, or both; public sector budget constraints; and the positive results of the early experiments with private sector participation in Chile and the United Kingdom. Between 1990 and 1997 sixty-two developing countries introduced private participation in the electricity sector to varying degrees-ranging from management contracts for the state-owned utility in Mali to the privatization of most sector operations in Argentina, Bolivia, and Hungary.

The Frost & Sullivan research service titled Private Power Generation Opportunities in South Africa provides a comprehensive overview of the dynamics driving market growth, the industry challenges and the current and anticipated projects. In this study, Frost & Sullivan's

expert analysts have thoroughly examined the various application areas such as Wind, Solar, Small Hydro, Coal, Gas, Diesel and Oil.

GBI Research, a leading business intelligence provider, has released its latest research, Power Market in SAARC Countries to 2020 - FDI Driven by Private Sector Participation is key to future growth. The report gives an in-depth analysis of power markets in seven SAARC countries namely India, Pakistan, Bhutan, Bangladesh, Nepal, Afghanistan and Sri Lanka, with forecasts through to 2020.

Indian reform legislation has been more on improving financial viability of power sector than on improving access to electricity. These attempts are not addressing core issues like consumer interest, reliability, supply of reasonable power and quality of power. Therefore the situation requires intense and urgent efforts on the part of the public-interest organizations to take up challenges thrown up by the reform process in general and the regulatory processes in particular.

Uncertain prospects of getting paid for their supplies, private investors held back from investing in the sector, despite substantial reforms and incentives. In view of inadequate cost recovery and the reforms turned out to be unsustainable, the limiting factors one of which is essentially a single-buyer market. It may further be seen that momentum for sustainability is derived from people. The solutions proposed are not limited to the provision of products and services to cater the unmet needs of Indians from the viewpoint of consumers but to think of them as partners and allies in the fight for sustainability. In this perspective of its socio-economic realities, government's role becomes important.

In study of developing countries it has been witnessed that apart from macroeconomic stability, the pace and sequencing of reforms has a strong influence on private investment in the power sector. It is observed that the study of variation across states in the timing of reforms to examine the impact of restructuring on plant performance and thermal efficiency reveals that unbundling significantly improved average annual plant availability. It is also concluded that Private investors have incentives to expand services and the ability to finance the investments that expansion requires if provided with appropriate regulatory or contractual commitments. In view of the above it has also been advocated that unbundling of utilities like electricity with

clarity on issues related to legal unbundling, functional unbundling and accounting unbundling can make it more effective and efficient.

Research Gap:

On completion of the literature review, it is observed that sector wise classification such as private sector's contribution to power generation in Uttar Pradesh is not very well addressed in view of its potential for significant contribution in changing scenario of power generation and open access to private sector participation. With the given background of lowest per capita power consumption, population increase, infrastructure growth and industrialization, it appears that these factors may influence the growth of power sector in Uttar Pradesh provided the sectoral reforms are proper and adequate for facilitating fuel supply, realization of revenue and reduction in various losses. Besides these, conducive government policy, workforce & political stability and encouragement of market driven mechanism, are few other important influencing factors which pave the growth of private sector participation. Therefore the gap identified for the study is mainly focused on identifying the factors affecting sustainability of private sector participation in power generation. It has also been attempted to determine the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh. Since these factors are greatly influenced by the policies of the Government, therefore it has been an earnest need to assess the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.

Chapter-3
Research Methodology

The proposed Research Methodology aims to solve the research problem with extensive use of primary data. However, secondary data is collected to assess the market potential where the probable demand pattern is likely to grow and the factors affecting the same may it be techno commercial, consumer behavior, regulatory or environmental. The related primary data may be backed up by secondary data from reliable sources and published data from government agencies.

3.1 Statement of the problem:

Based on the outcome of the literature review it has been noted that there are factors which influence sustainability and there are problems and challenges being faced in the above perspective. The role of the government thus becomes facilitator and not the service provider and therefore the role of government relates more to policy making and ensuring implementation of the same in open market mechanism.

The study has been conducted with the background of following problems & prospects of private sector participation in the state of Uttar Pradesh with the domestic consumers in focus.

1 What are the factors influencing the sustainability of private sector participation in power generation in the geographical region of Uttar Pradesh.
2 What are the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh
3 What is the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.
4 What are the measures by which private sector participation in power generation in Uttar Pradesh could be increased.
5 What is the probable impact of private sector power generation on consumers in Uttar Pradesh.

3.2 Research Objectives:

In the common parlance Research refers to a search for knowledge and is a process of exhaustive investigation. Also it is an investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.

The objective behind the entire endeavor is to understand the business potential of power sector with special reference to the possibility of private sector participation in power generation ,its economic viability in terms of market driven mechanism for tariff structure and the effect of energy and power sector reform on this and the related ancillary industries.

The proposed study is aimed to find out, how the sustainable market can be established by the participation of private sector players in the field of power generation and distribution and the long term viability for the same. The objective is to analyze the pace of growth of power market in Uttar Pradesh within the limitations of Techno-Commercial aspects in the context of the factors of the neighboring states and within the framework of Indian power sector related policies.

Thus the objectives of the study lie within the frame of the following points.

1) To identify the factors affecting the sustainability of private sector participation in power generation in the geographical region of Uttar Pradesh.
2) To determine the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh
3) To assess the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.
4) To devise measures by which private sector participation in power generation in Uttar Pradesh could be increased.
5) To determine the probable impact of private sector power generation on consumers in Uttar Pradesh.

3.3 Scope of Study:

The scope of study include the factors affecting sustainability in terms of implementation of Government policy , capital investment cost , fuel cost ,operation & maintenance cost and modernization of transmission and distribution network. In view of the state government being the single buyer there had been problems relating to revenue collection and proper recoveries.

The future prospects of increasing demand due to population growth and economic development are of vital importance. Adoption of alternate source of power generation which includes wind and solar power etc. have also been touched upon to seek view of private power generation companies in the perspective of rising demand for power in both the aspects quantity and quality.

After the setup of a power generation project the fuel supply remains a critical issue for sustainability for which backward integration of fuel supply may be done for fuel security and gas based power projects can be set up for sustainability cost benefit solution.

Other problems and challenges have also been considered for the opinion of power generation companies such as land acquisition problem, risk of timely payment, inadequate cost recovery, and impact of load shedding and geographical risk of fuel security wherein coal assets are acquired abroad by the power generating company.

The various aspects related to policies of the government of Uttar Pradesh and issues of administration and beaurocratic functioning, simplification of procedure and license raj have also been discussed.

As it is expected that private sector industrial consumers prefer to install a captive power plant in case the option of subsidized power provided by the state government is eliminated the above study is limited to domestic consumers.

3.4 Testing of Survey questionnaire & Hypothesis testing

The survey questionnaire was administered in two categories, one addressed to the private power generation companies and other addressed to the end consumers. While the first questionnaire was meant to assess the impact of various factors affecting sustainability , problems and challenges that confront private sector participation , impact of government policies and measures by which private sector participation could be increased , the second questionnaire was meant for the response of end consumers for which hypothesis testing shall be done.

3.4.1 Testing of statements on the survey administered to power generation companies

1) **Related to sustainability of private sector participation in power generation in Uttar Pradesh**

1 a) Implementation of Govt. policy would significantly impact the sustainability of private sector power generation.

1 b) Investment cost would have significant impact on the sustainability of private sector participation in power generation.

1 c) Fuel cost would have significant impact on the sustainability of private sector power generation.

1 d) Operation & Maintenance cost would have significant impact on the sustainability of private sector power generation.

1 e) Modernization of transmission & distribution would have a significant impact on the sustainability of private sector power generation.

1 f) Govt. being single buyer is impacting conversely on the sustainability of private sector power generation.

1 g) An increasing trend of population growth in U.P. would significantly impact consumption of Electricity (power).

1 h) A rising trend of economic growth in U.P. would significantly impact consumption of Electricity (power).

1 i) Private companies have a significant cost benefit if they undertake gas based power projects.

2) Related to problems and challenges that confront private sector participation in power generation in Uttar Pradesh

2 a) Risk of timely payment by distribution companies in U.P. would significantly impact privatization.

2 b) Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process.

2 c) Land acquisition problems would significantly hinder the privatization process.

2 d) Fuel supply problems would significantly hinder the privatization process.

2 e) Inadequate infrastructure is one of the reasons that would significantly hinder the privatization process.

2 f) Inefficient transmission and distribution capacity would significantly hinder the privatization process.

2 g) Inadequate cost recovery would significantly hinder the privatization process.

2 h) Bias of state regulators for public sector corporations or against private sector companies would significantly hinder the privatization process.

2 i) Non payment of power generation bill would significantly hinder the privatization process.

2 j) Load shedding would significantly impact the potential of growth of private sector power companies.

2 k) Geopolitical risk in case of coal asset acquired abroad would have significant impact on privatization process.

2 l) Intervention by NGO s would have significant impact on privatization process.

3) **Related to role and impact of Government policies relating to private sector participation in power generation in Uttar Pradesh**

3 a) Financial promotional and fiscal incentives can support the growth of private sector participation in power generation in U.P.

3 b) Improvement in administrative and beaurocratic functioning of the growth could significantly increase the pace of privatization in U.P.

3 c) Simplification of procedure would have a significant impact on the private sector participation in power supply and generation in U.P.

3 d) Reduction in administrative delays would have a significant impact on boosting private sector participation in U.P.

3 e) End of License Raj regime would have a significant impact on boosting private sector participation in U.P.

3 f) Improvement in overall policies of the Government would have a significant impact on privatization in power generation in UP.

4) **Related to measures by which private sector participation in power generation can be improved in Uttar Pradesh**

4 a) Backward integration of fuel supply by private companies would have significant impact on security.

4 b) Private companies have significant prospects relating to producing electricity through renewable energy sources in U.P.

3.4 .2 Hypothesis Testing:

Based on the objectives and the problem statements relating to end consumers of Uttar Pradesh, following are the hypothesis made which are required to be tested with the help of primary data based on the survey questionnaire meant for end consumers of power on the basis of various demographic parameters such as area/district, age occupation & income group.

H1: Hypothesis related to Impact of Market driven (non-subsidized) price mechanism to improve the availability and reliability of power in U.P.

Hypothesis H1a: There is no significant difference in the mean value in the expectation that Market driven (non- subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various areas/districts.

Hypothesis H1b: There is no significant difference in the mean value in the expectation that Market driven (non- subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various age groups.

Hypothesis H1c: There is no significant difference in the mean value in the expectation that Market driven (non- subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various occupation.

Hypothesis H1d: There is no significant difference in the mean value in the expectation that Market driven (non- subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various income groups.

H2: Hypothesis related to immediate privatization of power generation and distribution to improve power generation & distribution in U.P.

Hypothesis H2a: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various areas/districts.

Hypothesis H2b: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various age groups.

Hypothesis H2c: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various occupations.

Hypothesis H2d: There is no significant difference in the mean value in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various income groups.

H3: Hypothesis related to environmental impacts on large size plants/capacity addition of power plants in U.P.

Hypothesis H3a: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various areas/districts.

Hypothesis H3b: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various age groups.

Hypothesis H3c: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various occupations.

Hypothesis H3d: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various income groups.

H4: Hypothesis related to high capital investment and likely of increased tariff in open market of power generation in U.P.

Hypothesis H4a: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various areas/districts.

Hypothesis H4b: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various age groups.

Hypothesis H4c: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various occupation groups.

Hypothesis H4d: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various income groups.

H5: Hypothesis related to privatization which may not have any effect on subsidies provided for household consumers in U.P.

Hypothesis H5a: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various areas/districts.

Hypothesis H5b: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various age groups.

Hypothesis H5c: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization across various occupation.

Hypothesis H5d: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various income groups.

H6: Hypothesis related to privatization which may result on pricing of power based on price band method for the amount of power consumed initially subsidized upto a certain level and subsequently on actual market price (non-subsidized) mechanism.

Hypothesis H6a: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various areas/districts .

Hypothesis H6b: : There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option , across various age groups .

Hypothesis H6c: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various occupations.

Hypothesis H6d: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of

power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various income groups.

H7: Hypothesis related to private companies in power generation that may have stronger incentive to comply with quality standards and other regulatory obligations.

Hypothesis H7a: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations , across various areas/districts.

Hypothesis H7b: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various age groups.

Hypothesis H7c: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various occupations.

Hypothesis H7d: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various income groups.

H8: Hypothesis related to the need of privatization of transmission / distribution to be done before privatization of power generation in Uttar Pradesh.

Hypothesis H8a There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various areas/districts.

Hypothesis H8b: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various age groups.

Hypothesis H8c: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various occupations.

Hypothesis H8d: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various income group.

H9: Hypothesis related to privatization which may have the impact of reducing power deficit through the addition of power generation capacity by private companies

Hypothesis H9a: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various areas/districts.

Hypothesis H9b: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various age groups.

Hypothesis H9c: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various occupations.

Hypothesis H9d: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various income groups.

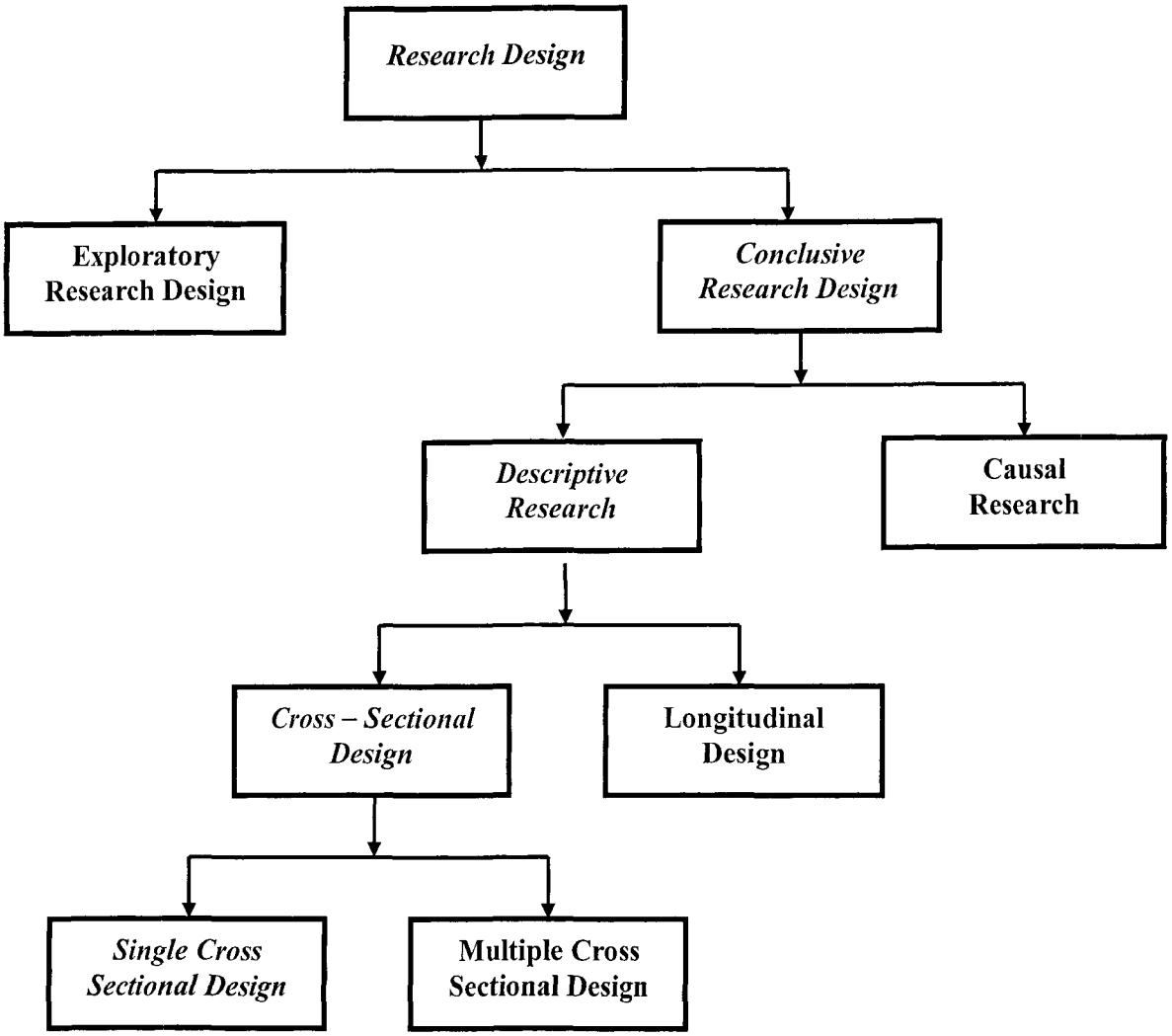
3.5. Type of Research

The study is mainly descriptive and partially exploratory in nature, however extensive use of primary data along with the secondary data processing and opinion poll of customers is incorporated to assess the situation close to practicality. The emphasis is to analyze the present situation and the likelihood of the movement of the trend based on the data collected in view of the present Techno-Commercial viabilities under the given set of conditions and known/established facts.

The use of both Primary and Secondary data has been done taking into account the secondary data as well, however in view of the limitations and disadvantaged of secondary data (as that have already been collected for purpose other than the problem at hand) primary data generation has done based on the outcome of secondary data available . Information is sourced

from books, newspapers, trade journals, industry portals, government agencies, trade associations, monitoring industry news and developments and through access to unpaid/paid databases (such as EBSCO) for secondary data collection.

A Summary of research design used for this study is presented in the following exhibit.



Conclusive Research: Information needed is clearly defined and the research process is formal and structured. Sample is representative and data analysis is quantitative.

Descriptive Research: It describes the relation between independent and dependent variable. It has a structured research design conducted normally through surveys.

Cross Sectional Design: Involves the collection of information from any given simple of population elements only once

3.6. Population/Universe

The primary data which is the survey output is exhaustively analyzed to understand the situation from various angles such as from and under the government policy, power deficit, tariff plans & changing market conditions across various age groups , income groups , occupation and areas.

The population universe is the Power market comprising of six of major cities under discussion. The criteria for selection of samples is based on the secondary source report of CRISIL (Research Outlook 2007-08 to 2011-12: Sector: Power) regarding top 20 major potential cities/districts of Uttar Pradesh. Three each of two groups namely Muzzafarnagar, Kanpur , Agra & Allahabad , Varanasi ,Gorakhpur have been considered for the survey administered personally during Oct 2012 to Nov 2012 taking 60 samples from each city/district totaling 360 samples.

In another survey targeted to get response from the prospective private sector power generation companies of India willing to set up new power projects the sample size was about 25 power generation companies (67 respondents).

3.7. Sampling procedure

The primary data which is the survey output samples is exhaustively analyzed to understand the situation from various angles such as from factors affecting the market and under the controlled market conditions. An average of 60 number of samples from six cities /districts/area of Uttar Pradesh totaling to 360 samples.

The survey was done through a detailed questionnaire to 'End consumers of power' (Electricity) who were contacted at the office of the electricity bill collection center. Among the persons available there every fifth person was requested to fill the questionnaire. In case of unwillingness of any such the next person available was contacted.

Another questionnaire was made for responses from the 'Private sector power generating companies' of India who can be prospective companies for setting up of new

plants in Uttar Pradesh was administered electronically. Snow ball technique was used for getting the details of various key personnel of private power generation companies which aggregated to 67 respondents from about 25 companies. Follow up was done telephonically for the sent questionnaire over email to power generating companies.

Few of the people who were not available through electronic survey were sent the questionnaire directly in word file attachment and view were incorporated. For validation of the hypothesis a structured technique of data collection in the form of questionnaire is used for different purposes. The questionnaire is designed accordingly so as to specify the information needed.

Based on the survey method classified by mode of administration the questionnaire is designed / based on the Mall intercept personal interview method the feedback of which is collected to make samples of the same.

In the sampling process potential sources of error can be Random sampling error & response errors (in non-sampling error) as there is no inclusion of non-response error.

3.8. Questionnaire Development and Administration

Development of research instrument involved identification of constructs, method of survey to be employed, questionnaire design, pretesting of questionnaire and administration of final questionnaire. The broad methodology adopted in developing the survey instrument used in the study is illustrated as following exhibit. The same is followed by a discussion on the steps involved in the design.

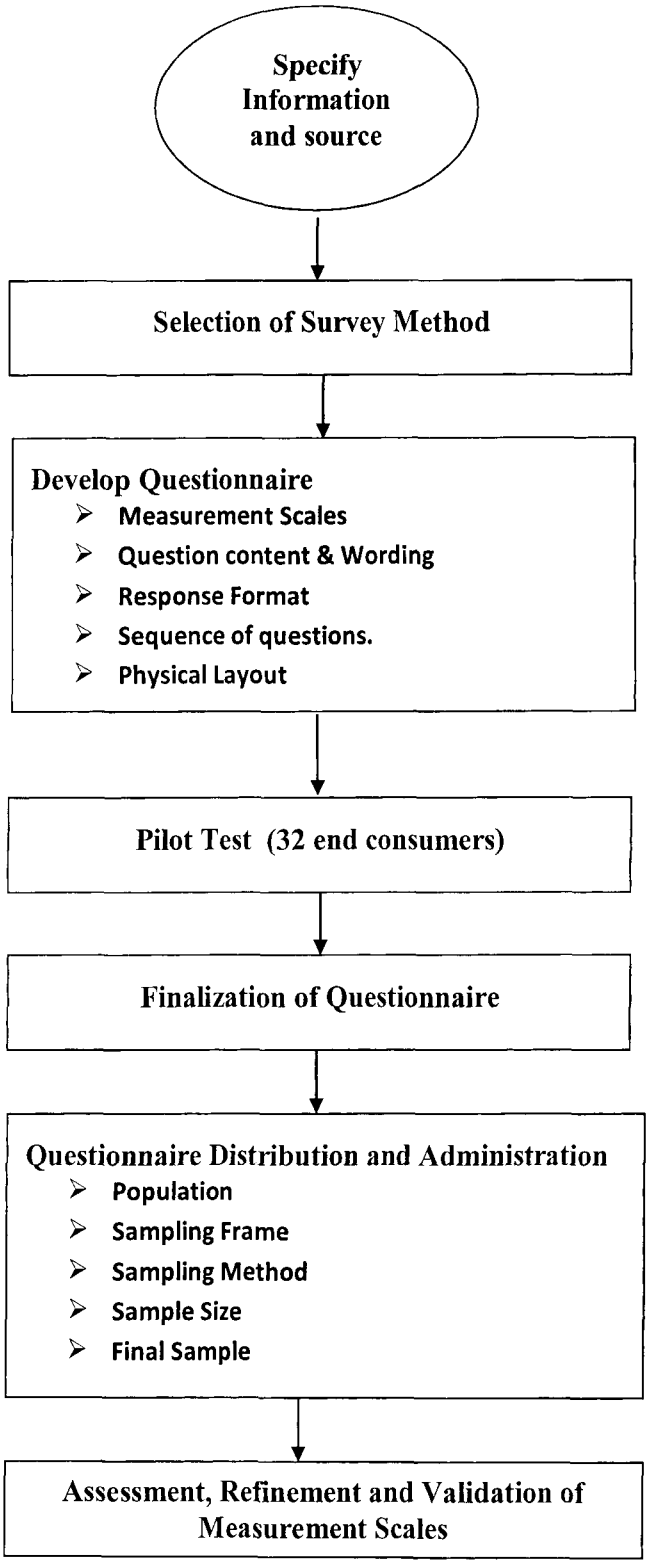


Fig 3.1 Questionnaire Development

Source : Adapted from Naresh K Malhotra (2007)

3.9. Selection of Survey Method

The decision to choose a survey method may be based on number of factors which include sampling, type of population, question form, question content, response rate, and duration of data collection (Aakar, Kumar & Day, 2002). In view of the nature of the study it was decided to personally administer the structured research instrument developed for the study. The language used in the questionnaire was mainly Hindi as the target population of Uttar Pradesh is well versed in Hindi. Otherwise too, Hindi is widely spoken and understood in Uttar Pradesh. The main benefits of the method adopted are listed below.

a. The questions can be answered by ticking the proper response format and with an interviewer present respondents could seek clarity on any questions (Aaker et al., 2002 Boyd, Westfall & Stasch, 2003)
b. The respondents are more motivated to respond as they are not obliged to admit their confusion or ignorance to the interviewer (hays, 1998; Boyd et al., 2003)
c. A higher response rate can be assured since the questionnaire are collected immediately once they are completed (Malhotra, 2007)
d. This method offered highest degree of control over sample selection (Malhotra, 2007)

However, it was time consuming as wide geographic region was to be covered comprising six districts of Uttar Pradesh.

Since the domain was covering six major cities of Uttar Pradesh which were selected on the basis of being high potential area of eastern and western circles of Uttar Pradesh, 3 each cities of the two circles were chosen (CRISIL report basis).

In other survey questionnaire meant for power generation companies the views were taken electronically submitted to 67 respondents (about three top management level executives of about 25 companies) and follow up was done telephonically. The details of these executives were taken through snow ball techniques so as to collect the respondents from the top private power generation companies.

As only one respondent was taken to be adequate from one power Generation Company, the 16 responses received from different companies were considered for analysis taking the mean values.

3.9.1 Measurement Scales

As this study aims to measure consumer perception towards the electric power supply quality, Likert scale was supposed to be the best suited on a five point scale.

Two type of questions were posed to end consumer 1) one Likert scale 2) along with few multiple choice (with open ended options) to assess the market potential. Similar questionnaire was made for survey of power generating companies.

These scales were then assumed to be interval scales, (Likert) as is commonly practiced in social science research (Perry, 1998; Hayes 1998) further interval scales were used to measure the subjective characteristics of respondents. For example, in this study, respondents were asked about their expectations and perception in relation private sector participation in power generation. This scale was used due to its strength in arranging the objects in specified order as well as being able to measure the distance between the differences in response rating (Malhotra 2007).

3.9.2 Question content and wording

The questions were designed to be short, simple and comprehensible. Care was taken to avoid ambiguous, vague, estimation based, generalization type, and leading, double barreled and presumptuous questions (Boyd et al. 2003)

3.9.3 Response format

Two types of response format were chosen: labeled & open ended multiple chance answer, so as to obtain respondents, perception towards private sector power generation companies. Apart from the simplicity in administration, it was easy to code for statistical analysis (Burns & Bush, 2002; Luck & Rubin, 1999). Labeled scale response format is appropriate in marketing research as it allows the respondents to respond to

attitudinal questions in varying degrees that describes the dimension being studied (Aaker et. al., 2002 Boyd et al. 2003). The other advantages of this scale are listed below.

a It yields higher reliability coefficients with fewer items that the scales developed using other methods (Hayes 1998)

b The scale is widely used in market research and has been extensively tested in both marketing and social science (Garland, 1991)

c It offers a high likelihood of responses that accurately reflect respondent opinion uder study (Burns et al. 2002, Wong, 1999, Zikmund, 2000)

d It helps to increase the spread of variance of responses which in turn provide stronger measures of association (Aaker et al. 2002, Wong, 1999)

e In relation to the number of scale points, there is no clear rule indication and ideal number. However, many research acknowledge that opinions can be captured best with five to seven point scale (aaker et al., 2002 Malhotra, 2007) Keeping the same in mind, five point Likert scale was used in this research.

3.9.4 Sequence of Questions

The questionnaire was short having eleven question to the end consumers & thirty four questions to the private power generation companies. The questions were framed based on the outcome of the literature review and making comprehensive question based on that.

3.9.5 Pilot Study

The preliminary questionnaire was pre tested. The aim was to ensure that the questions were eliciting the required responses, identify ambiguous wording or errors before the survey was carried out on a large scale (Zikmund, 2000, Burns et al. 2002, Malhotra, 2007). It should be noted that prior to pre testing, three management professors and two peer scholars were asked to review the questions and give their opinions in the quest for content validity. Some overlapping questions were detected and hence were dropped

from the list. After the review process, the questionnaire was ready to be pre tested in and exploratory survey.

The survey of end consumer started off in October 2012 with the selection of group of respondents based on convenience sample which is common for pilot tests (Zikmund, 2002, Boyd et al. 2003) in all 32 questionnaires were distributed to consumers to power to check for clarity of the measurement items. Consumers were asked to complete the questionnaire and also give open ended answers of their in few questions. A total 30 usable responses were obtained and based on the feedbacks of pilot study the questionnaire was slightly revised and reliability was established. The pilot scale study has shown a Chronbach alpha value of 0.82576739 which is quite an acceptable value.

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
0.82576739	11

Content validity of the scales used in the current research is established by their origins from the extant literature. The new items that are used for the first time have been developed through a careful review of the extant literature on the practical manifestations of the respective construct. Extensive discussions were held among Management Professors & peer Research Scholars who reviewed the questionnaire and confirmed that it (with minor change in words of few items) had face validity. After

evaluation of the questions, it was judged that all of these were appropriate for measuring consumer's attitude about service quality of power supply in Uttar Pradesh.

3.10 Administration of Final Questionnaire

The sampling process included several steps: definition of the population, establishment of the sampling frame, specification of the sampling method, determination of the sample size and selection of the sample (Malhotra 2007)

Step 1: Population. The target population for this study was defined as individuals of the select cities who are the end consumer of electricity (power) in the given city. A separate survey was conducted to private power generation companies with respondents from the top executives of private power generation companies.

Step 2: Sampling frame. The sample frame comprised of people of domestic household (about 360 from six districts) who are end consumer of power and are willing to participate in the survey. For power generation companies the views were taken electronically submitted to 67 respondents (about three top management level executives of about 25 companies)

Step 3: Sampling method. The sampling method used was convenience sampling and the required data was obtained using intercept technique of having personal interview of the random identified consumers (who were willing to participate) to fill & complete the survey questionnaire.

Step 4: Sample Size. Next step involved determining the sample size of this study. The required sample size depends on factor such as the proposed data analysis techniques, financial support and access to sampling frame (Malhotra, 2007) the data analysis are very sensitive to sample size (Tabachnick & Fidell , 2001, Garson 2007) As a general rule of thumb. Data from at least 300 cases is deemed comfortable, 500 considered as very good and 1000 as excellent (Comrey & Lee, 1992 Tabachnick et al, 2001, Garson 2007) since this survey was required to be done by personally the end were contacted

at the office of electricity bill collection by taking alternate persons and a sample size of 60 each totaling 360 was targeted for the questionnaire meant for end consumers.

In a separate questionnaire a target of 25 private sector power generation companies were made for views of the private sector power companies to get their view electronically by submitted it to 67 respondents of about 25 companies.

Step 5: Final sample. In all 377 consumers were randomly approached during the months of Oct 2012 – Nov. 2012, who were willing to participate in the study. Convenience sampling approach was used to collect the data from end consumers who were approached individually during the said periods at local electricity billing stations. Out of the 377 questionnaire distributed 375 were returned a total of 15 questionnaires were rejected as they were incomplete in various respects. This resulted in 360 usable responses.

In another survey targeted to get response from the prospective private sector power generation companies of India willing to set up new power projects the sample size was 25 power generation companies was administered key personnel of these companies electronically with follow up done over telephone.

3.11. Analysis Techniques

The final step was to select the appropriate statistical tools for analyzing the data. It involved steps such as coding the responses, cleaning, screening the data and selecting the appropriate data analysis strategy (Hau, 2005, Malhotra, 2007) for systematic approach, research elements namely the research problem, objectives, characteristics of data and the underlying properties of the statistical techniques need to be understood (Malhotra, 2007) to meet the objectives of the study, the following types of analysis were performed.

Descriptive analysis refers to the transformation of raw data into a form that would provide information to describe a set of factors in a situation that will make them easy to understand and interpret (Hau, 2005) this analysis gives a meaning to data through

frequency distribution, mean and standard deviation, which are useful to identify differences among groups.

Inferential analysis refers to the cause effect relationships between variables inferential statistics used for this research were Analysis of variance (ANOVA), Chi square test / Kruskal Wallis test. ANOVA has its strength over other multivariate analysis because it maximizes the differences among group membership of variables as a whole and helps to understand groups dimension differences (Hair et al, 1998)

The data were analyzed using MS Excel 2000 spreadsheet program & SPSS Statistical analysis Software. Appropriate statistical tools like Chi Square test / Kruskal wallis test and one way ANOVA have been applied on the collected data. to analyze the respondents with their perception of power supply in Uttar Pradesh (Boyd et al. 2003).

The analysis includes the following: Chi Square test, Kruskal wallis test and ANOVA, using software tools (SPSS, Excel etc.).

The outcome of the Survey Questionnaire based on the hypothesis is being analyzed using Chi Square test & Kruskal Wallis test for the given set of observed frequencies (n) which are subject to (k) independent restrictions (constraints) for an expected growth rate of the market per year while taking a given level of significance (say 0.05).

To test the hypothesis Chi Square (χ^2) shall be calculated and if the calculated value is equal to zero, there is perfect agreement between observed and expected frequencies. For a given null hypothesis if the significance value is > 0.05 then null hypothesis is accepted, otherwise it is rejected.

3.12 Limitations of the Study

Although efforts were made to carry on research that was theoretically and empirically sound, the study suffers from several limitations:

a. A general lack of reliable independent statistics regarding the satisfaction of end consumer of electricity (power) was observed. In view of the ever continuing monopoly and the sector being a state government entity no substantial secondary source of data was available nor does any survey exist by the service providers.
b. The study is restricted to specific cities of Uttar Pradesh. As only select areas of U.P. were taken from the select potential areas/ cities based on the CRISIL report, the study covers about 60 representative samples from the given places however their market size may vary.
c. The study assumed that the respondents were all individual customers whose individual perception and expectations relating to service quality controlled the decision regarding the available service and not taking into account possible impact of Govt policy or family influence.
d. The identified variables may have been influenced by the interest and the knowledge limitations of the customers, regardless of the attention & effort, and thus may not be considered to be exhaustive. Additionally collecting respondent's data on expectation and perceptions of the availability and quality at the same time could have compromised the reliability of the data.
e. The privatization of power generation is in early stage of growth in Uttar Pradesh and distribution of few areas are being privatized under government policies therefore the study may have got influenced in view of the policies of Government of Uttar Pradesh.

Although this study had a number of constraints, the research was successfully conducted. This success may be attributed to the development and application of a robust and flexible research design supported by valid and reliable research instrument that enable the researcher to minimize the effects of the aforementioned limitations.

Chapter-4

Analysis & Findings

The first set of questionnaire addressed to private sector power generation companies was meant to assess the impact of various factors affecting sustainability, problems and challenges that confront private sector participation, impact of government policies and measures by which private sector participation could be increased has been analyzed based on the mean value of the response on Likert scale for all the above categories.

The Second set of questionnaire was meant for the response of end consumers for which hypothesis testing has been done. The outcome of the survey conducted based on the hypothesis have been analyzed using Chi Square test & Kruskal Wallis test for the given set of observed frequencies (n) which are subject to (k) independent restrictions (constraints) for an expected growth rate of the market per year while taking a given level of significance (say 0.05).

To test the hypothesis Chi Square (χ^2) has been calculated and if the calculated value is equal to zero, there is perfect agreement between observed and expected frequencies. For a given null hypothesis if the significance value is > 0.05 then null hypothesis is accepted, otherwise it is rejected.

The data were analyzed using MS Excel 2000 spreadsheet program & SPSS Statistical analysis Software. Appropriate statistical tools like Chi Square test / Kruskal wallis test and one way ANOVA have been applied on the collected data to analyze the respondents with their perception of power supply in Uttar Pradesh are as following.

The following factors which affect the sustainability of private sector participation in power, on survey have revealed results as appended. It is inferred from the table that almost all mean values are higher than 3.5 which indicates that these have got significant impact on the factors affecting sustainability. It can also be inferred that many of the mean values higher that 4 .0 which indicates a much higher impact on the given factors.

Table 4.1 Analysis of Factors affecting sustainability

Factors affecting sustainability (on Likert scale)	1	2	3	4	5	Mean value
Implementation of Govt. policy	1	1	0	5	9	4.25
Investment cost	1	1	4	4	6	3.81
Fuel Cost	1	1	3	3	8	4.00
Operation cost	0	1	7	3	5	3.75
Maintenance Cost	0	3	7	1	5	3.50
Modernization of transmission & distribution	0	0	3	7	6	4.19
Govt. being single buyer	0	1	1	9	5	4.13
Future demand for electricity (power) due to population growth in U.P.	1	0	3	6	6	4.00
Future demand for electricity (power) due to economic development in U.P.	2	1	2	6	5	3.69
Cost benefit solution through Gas based power projects	2	1	4	4	5	3.56

The following factors which asses the Problems & Challenges that confront private sector participation, on survey have revealed as appended. It is inferred from the table that almost all mean values are higher than 3.5 (except one as discussed below the table) and many of which are approaching 4.0 which indicates that these have got significant impact on the factors which confront pvt sector participation. It can also be inferred that many factors with mean values higher that 4 .0 have a much higher impact on the given factors.

Table 4.2 Analysis of problems & challenges that confront private sector participation

Problems & Challenges that confront private sector participation	**1**	**2**	**3**	**4**	**5**	**Mean value**
Risk of timely payment by distribution companies in U.P.	2	0	0	2	12	4.75
Lack of knowledge & experience by private entrepreneurs	0	6	6	3	1	*2.94*
Land acquisition problems	1	1	1	5	8	4.13
Fuel supply problems	1	1	1	7	6	4.00
Inadequate infrastructure	0	2	0	7	7	4.19
Bias of state regulator against private sector	0	1	2	8	5	4.06
Inefficient transmission & distribution system	0	0	3	7	6	4.19
Inadequate cost recovery	1	0	2	6	7	4.13
Non payment of power generation bill by the Govt. of U.P.	1	1	0	4	10	4.31
Load shedding effect on potential of growth	0	0	4	8	4	4.00
Longer breakeven point (duration)	1	1	2	6	6	3.94
Geopolitical risk in case of coal assets acquired abroad by the power generating company	1	1	2	8	4	3.81
Intervention by NGO's	0	0	6	8	2	3.75

The statement "*Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process*" with *a mean value of 2.94 (less than 3.0) and therefore inferred that it has not been accepted by the private power generating companies concluding thereby that "Private Power generating companies have the competency of their domain and therefore this factor would not hinder the privatization process".*

The following factors which are related to policies of the government, on survey have revealed results as appended. It is inferred from the table that all mean values are higher than 4.0 which indicates that these have got a much higher impact on the given factors.

Table 4.3 Analysis of aspects related to policies of the Government

Aspects related to Policies of the Government	1	2	3	4	5	Mean value
Financial, Promotional & fiscal incentives	0	1	4	4	7	4.06
Improvement in administration & beaurocratic functioning	0	2	1	3	10	4.31
Simplification of procedure	0	2	3	4	7	4.00
Reduction in Administrative Delays	0	1	3	2	10	4.31
End of License Raj	0	1	2	5	8	4.25
Overall policies of the Govt. of UP	0	1	2	5	8	4.25

The following factors which are related to measures by which pvt sector participation could be increased, on survey have revealed results as appended. It is inferred from the table that for the mean value higher than 3.5 indicates that, by backward integration of fuel supply significant contribution can be done in private sector participation which is a measure by which private sector participation could be increased. It can also be inferred that for the mean values higher that 4 .0 regarding adoption of alternate source of power has a high impact as a measure by which private sector participation could be increased.

Table 4.4 Analysis of measures by which pvt sector participation could be increased

Measures by which private sector participation could be increased	1	2	3	4	5	Mean value
Backward integration of fuel supply for fuel security	1	2	2	7	4	3.69
Adoption of alternate source of Power generation (wind, solar etc.)	1	1	4	6	4	4.19

The hypothesis testing, relating to end consumers which focus on the response of the end consumers on privatization has been discussed as following.

Hypothesis H 1 a : There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various areas/districts.

Q1					
Area / District	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.80	1.054		
Kanpur	60	3.12	1.277		
Agra	60	4.52	.854		
Allahabad	60	3.90	.706	11.113	0.000
Varanasi	60	3.40	1.554		
Gorakhpur	60	3.28	1.462		
Total	360	3.67	1.273		

From the above data it is inferred that the mean value for the districts Agra & Allahabad are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various districts/cities in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh have varied opinion on the basis of area.

Hypothesis H 1 b : There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various age groups.

Q 1 Age groups	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	3.86	1.332	1.681	0.154
31-40	88	3.38	1.472		
41-50	107	3.79	1.147		
51-60	86	3.72	1.195		
More than 60	44	3.70	1.193		
Total	360	3.67	1.273		

From the above data it is inferred that the mean value for the age groups of upto 30 & 41-50 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh stands valid by all age groups.

Hypothesis H 1 c: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various occupation.

Q1 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.68	1.323	1.099	0.357
Business	73	3.79	1.105		
Teaching-std	32	3.25	1.481		
Housewife	12	3.83	.937		
Rtd from service	37	3.68	1.180		
Total	360	3.67	1.273		

From the above data it is inferred that the mean value for the housewives & business personnel are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupations in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh stands valid by all occupation groups.

Hypothesis H 1 d: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various income groups.

Q1					
Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.78	1.298	3.468	0.009
Rs 10000-20000	99	3.33	1.498		
Rs 20000-35000	72	3.58	1.148		
Rs 35000-50000	71	3.83	1.146		
More than Rs 50000	64	4.02	1.016		
Total	360	3.67	1.273		

From the above data it is inferred that the mean value for the income groups More than Rs 50000 & Rs 35000-50000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various income group in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh has varied opinion on the basis of income group.

Hypothesis H 2 a: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various areas/districts.

Q2 Area/District	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	4.00	.974		
Kanpur	60	3.77	1.198		
Agra	60	4.13	.676		
Allahabad	60	3.78	.783	6.645	0.000
Varanasi	60	3.13	1.535		
Gorakhpur	60	3.42	1.293		
Total	360	3.71	1.160		

From the above data it is inferred that the mean value for the districts Agra & Muzaffarnagar are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various districts/cities in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh have varied opinion on the basis of area.

Hypothesis H 2 b: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various age groups.

Q2 Age group	N	Mean	Std. Deviation	Std. Error	F	Sig.
Upto 30	35	3.77	1.190	.201	2.530	0.040
31-40	88	3.61	1.159	.124		
41-50	107	3.81	1.001	.097		
51-60	86	3.45	1.411	.152		
More than 60	44	4.07	.818	.123		
Total	360	3.71	1.160	.061		

From the above data it is inferred that the mean value for the age group more than 60 & 41-50 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various age groups in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh have varied opinion on the basis of age.

Hypothesis H 2 c: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various occupations.

Q 2 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.60	1.212	1.025	0.394
Business	73	3.84	1.041		
Teaching-std	32	3.78	1.211		
Housewife	12	3.83	1.115		
Rtd from service	37	3.92	1.038		
Total	360	3.71	1.160		

From the above data it is inferred that the mean value for the group of retired persons, business persons housewives are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh stands valid by all occupation groups.

Hypothesis H 2 d: There is no significant difference in the mean value in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various income groups.

Q2 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.78	1.093	4.423	0.002
Rs 10000-20000	99	3.62	1.315		
Rs 20000-35000	72	3.29	1.305		
Rs 35000-50000	71	3.90	.973		
More than Rs 50000	64	4.03	.796		
Total	360	3.71	1.160		

From the above data it is inferred that the mean value for the income groups More than Rs 50000 & upto Rs 35000-5000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various income group in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh have varied opinion on the basis of income group.

Hypothesis H 3 a: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various areas/districts.

Q3 Area/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.58	1.124		
Kanpur	60	3.20	1.147		
Agra	60	3.48	1.097		
Allahabad	60	3.43	.810	1.749	0.123
Varanasi	60	3.53	1.186		
Gorakhpur	60	3.13	1.081		
Total	360	3.39	1.087		

From the above data it is inferred that the mean value for the districts Muzzafarnagar ,Varanasi & Agra are on higher side than others **which indicates that the population of the above areas is better aware of the environmental aspects**.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various areas /districts in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that large size plants/further capacity addition of power plants will have environmental impacts stands valid by all areas/districts.

Hypothesis H 3 b: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various age groups.

Q3 Age group		Mean	Std. Deviation	F	Sig.
Upto 30	35	3.77	1.114	1.224	0.300
31-40	88	3.40	.989		
41-50	107	3.35	1.056		
51-60	86	3.34	1.174		
More than 60	44	3.32	1.137		
Total	360	3.39	1.087		

From the above data it is inferred that the mean value for the age group up to 30 are on higher side which says that **the majority of the young population is aware of the environmental aspects** of capacity addition of power generating plants.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that large size plants/further capacity addition of power plants will have environmental impacts, stands valid by all age groups.

Hypothesis H 3 c: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various occupation.

Q 3 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.44	1.106	.315	0.868
Business	73	3.33	.958		
Teaching-std	32	3.28	1.170		
Housewife	12	3.50	1.168		
Rtd from service	37	3.32	1.156		
Total	360	3.39	1.087		

From the above data it is inferred that the mean value for the group of housewives and service class are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that large size plants/further capacity addition of power plants will have environmental impacts, stands valid by all occupation groups.

Hypothesis H 3 d: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various income groups.

Q 3					
Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.19	1.150	1.339	0.255
Rs 10000-20000	99	3.52	1.128		
Rs 20000-35000	72	3.47	1.074		
Rs 35000-50000	71	3.24	.948		
More than Rs 50000	64	3.47	1.112		
Total	360	3.39	1.087		

From the above data it is inferred that the mean value for the income groups Rs 10000-20000 , 20000-35000 & More than 50000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across income groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that expectation that large size plants/further capacity addition of power plants will have environmental impacts stands valid by all income groups.

Hypothesis H 4 a: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system across various areas/districts.

Q 4					
Area/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.63	.901		
Kanpur	60	3.73	.880		
Agra	60	4.03	.610		
Allahabad	60	3.88	.739	6.772	.000
Varanasi	60	3.18	1.334		
Gorakhpur	60	3.32	1.186		
Total	360	3.63	1.012		

From the above data it is inferred that the mean value for the districts Agra & Allahabad are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various districts/cities in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system in Uttar Pradesh have varied opinion on the basis of area.

Hypothesis H 4 b: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system across various age groups.

Q4 Age groups	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	3.57	1.008	1.029	0.392
31-40	88	3.73	1.025		
41-50	107	3.72	1.007		
51-60	86	3.47	1.048		
More than 60	44	3.59	.923		
Total	360	3.63	1.012		

From the above data it is inferred that the mean value for the age group 31-40 & 41-50 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system stands valid by all age groups.

Hypothesis H 4 c: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system across various occupation groups.

Q 4 Occupations	N	Mean	Std. Deviation	F	Sig.
Service	206	3.62	1.065	.327	0.859
Business	73	3.63	1.021		
Teaching-std	32	3.81	.693		
Housewife	12	3.50	1.168		
Rtd from service	37	3.59	.896		
Total	360	3.63	1.012		

From the above data it is inferred that the mean value for the group of teaching / studying and business groups are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system, stands valid by all occupation groups.

Hypothesis H 4 d: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system across various income groups.

Q4 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.56	1.040	1.822	0.124
Rs 10000-20000	99	3.51	1.119		
Rs 20000-35000	72	3.53	1.074		
Rs 35000-50000	71	3.75	.874		
More than Rs 50000	64	3.88	.845		
Total	360	3.63	1.012		

From the above data it is inferred that the mean value for the income groups of more than Rs 50000 & Rs 35000-50000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various income groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system, stands valid by all income groups.

Hypothesis H 5 a: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various areas/districts.

Q5 Areas/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.97	.938		
Kanpur	60	4.10	1.020		
Agra	60	4.52	.537		
Allahabad	60	4.07	.710	6.405	.000
Varanasi	60	3.60	1.380		
Gorakhpur	60	3.92	.619		
Total	360	4.03	.947		

From the above data it is inferred that the mean value for the districts Agra & Kanpur/ Allahabad are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various districts/cities in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization have varied opinion on the basis of area.

Hypothesis H 5 b: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various age groups.

Q5 Age group	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	4.03	.985	2.620	0.035
31-40	88	4.15	.941		
41-50	107	4.18	.737		
51-60	86	3.80	1.146		
More than 60	44	3.86	.878		
Total	360	4.03	.947		

From the above data it is inferred that the mean value for the age group 41-50 & 31-40 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across age groups in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization have varied opinion on the basis of age group.

Hypothesis H 5 c: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization across various occupation.

Q5 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	4.01	.995	1.132	0.341
Business	73	4.16	.624		
Teaching-std	32	4.12	1.100		
Housewife	12	3.92	1.084		
Rtd from service	37	3.78	1.004		
Total	360	4.03	.947		

From the above data it is inferred that the mean value for the business groups and teaching/studying are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, stands valid by all occupation groups.

Hypothesis H 5 d: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various income groups.

Q5 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	4.19	.585	9.010	.000
Rs 10000-20000	99	3.74	1.157		
Rs 20000-35000	72	3.72	1.178		
Rs 35000-50000	71	4.35	.588		
More than Rs 50000	64	4.33	.565		
Total	360	4.03	.947		

From the above data it is inferred that the mean value for the income groups of 35000-50000 & more and upto Rs 10000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various income groups in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization have varied opinion on the basis of income group.

Hypothesis H 6 a: There is no significant difference in the mean value across various areas/districts in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option.

Q6 Areas/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.82	.911		
Kanpur	60	3.82	1.157		
Agra	60	4.10	.681		
Allahabad	60	3.72	.922	2.255	0.049
Varanasi	60	3.65	1.176		
Gorakhpur	60	3.48	1.384		
Total	360	3.76	1.072		

From the above data it is inferred that the mean value for the districts Agra & Kanpur/Muzzafarnagar are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various areas groups in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option have varied opinion on the basis of areas/districts.

Hypothesis H 6 b: There is no significant difference across various age groups in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option.

Q6 Age group	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	3.89	.758	2.762	0.028
31-40	88	3.51	1.184		
41-50	107	3.93	.959		
51-60	86	3.65	1.176		
More than 60	44	4.00	1.012		
Total	360	3.76	1.072		

From the above data it is inferred that the mean value for the age group more than 60 and 41-50 years are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across various age groups in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option , have varied opinion on the basis of age group.

Hypothesis H 6 c: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various occupations .

Q6 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.77	1.000	.925	0.449
Business	73	3.79	1.142		
Teaching-std	32	3.50	1.344		
Housewife	12	4.17	.835		
Rtd from service	37	3.78	1.134		
Total	360	3.76	1.072		

From the above data it is inferred that the mean value for the group of housewives and business groups are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option , stands valid by all occupation groups.

Hypothesis H 6d: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various income groups.

Q6 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.74	1.049	1.566	0.183
Rs 10000-20000	99	3.59	1.212		
Rs 20000-35000	72	3.78	1.064		
Rs 35000-50000	71	4.00	.956		
More than Rs 50000	64	3.78	.967		
Total	360	3.76	1.072		

From the above data it is inferred that the mean value for the income groups Rs 35000-50000, Rs 20000-35000 & more than 50000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across income groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option stands valid by all income groups

Hypothesis H 7 a: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations , across various areas/districts.

Q7 Area/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	4.17	.905		
Kanpur	60	3.40	1.167		
Agra	60	4.15	.659		
Allahabad	60	3.95	.675	12.034	.000
Varanasi	60	3.17	1.330		
Gorakhpur	60	3.22	1.290		
Total	360	3.68	1.118		

From the above data it is inferred that the mean value for the districts Muzzafarnagar & Agra are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across areas in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, have varied opinion on the basis of areas.

Hypothesis H 7 b: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations , across various age groups.

Q7 Age groups	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	3.60	1.090	1.469	0.211
31-40	88	3.56	1.081		
41-50	107	3.83	1.059		
51-60	86	3.53	1.205		
More than 60	44	3.86	1.153		
Total	360	3.68	1.118		

From the above data it is inferred that the mean value for the age group more than 60 & 41-50 years are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations stands valid by all age groups.

Hypothesis H 7 c: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various occupations.

Q7 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.62	1.101	2.064	0.085
Business	73	3.84	1.000		
Teaching-std	32	3.34	1.208		
Housewife	12	4.25	1.138		
Rtd from service	37	3.76	1.278		
Total	360	3.68	1.118		

From the above data it is inferred that the mean value for the group of housewives and business groups are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupations in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, stands valid by all occupations.

Hypothesis H 7 d: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various income groups.

Q7 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.61	1.156	1.352	0.250
Rs 10000-20000	99	3.48	1.232		
Rs 20000-35000	72	3.72	1.141		
Rs 35000-50000	71	3.85	1.064		
More than Rs 50000	64	3.78	.899		
Total	360	3.68	1.118		

From the above data it is inferred that the mean value for the income groups Rs 35000-50000 & more than 50000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that significant difference exists across income groups the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, stands valid all on the basis of income groups.

Hypothesis H 8 a: There is no significant difference in the mean in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. value across various areas/districts.

Q8 Area/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	3.90	1.020		
Kanpur	60	3.45	1.080		
Agra	60	4.27	.841		
Allahabad	60	4.17	.615	14.662	.000
Varanasi	60	2.97	1.402		
Gorakhpur	60	4.08	.962		
Total	360	3.81	1.108		

From the above data it is inferred that the mean value for the districts Agra & Allahabad are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across areas in the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P., have varied opinion on the basis of areas.

Hypothesis H 8 b: There is no significant difference across various age groups in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P.

Q8					
Age group	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	3.86	.912	0.641	0.633
31-40	88	3.85	1.189		
41-50	107	3.85	1.017		
51-60	86	3.64	1.197		
More than 60	44	3.89	1.125		
Total	360	3.81	1.108		

From the above data it is inferred that the mean value for the age group from upto 30 years till 50 years are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. stands valid by all age groups.

Hypothesis H 8 c: There is no significant difference in the mean value across various occupations in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P.

Q8 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	3.74	1.163	1.057	0.378
Business	73	4.04	.889		
Teaching-std	32	3.75	1.107		
Housewife	12	3.83	1.193		
Rtd from service	37	3.73	1.146		
Total	360	3.81	1.108		

From the above data it is inferred that the mean value for the group of business groups & housewives are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P, stands valid by all occupation groups.

Hypothesis H 8 d: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P., across income groups.

Q8 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	3.96	1.027	2.718	0.030
Rs 10000-20000	99	3.53	1.280		
Rs 20000-35000	72	3.78	1.116		
Rs 35000-50000	71	3.90	1.002		
More than Rs 50000	64	4.03	.908		
Total	360	3.81	1.108		

From the above data it is inferred that the mean value for the income groups more than 50000 and upto Rs 10000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is < 0.05 and therefore it is inferred that significant difference exists across income groups the statement made and therefore the null hypothesis is rejected.

In the perspective of the inference made it is concluded that in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. , have varied opinion on the basis of income groups.

Hypothesis H 9 a: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various areas/districts .

Q9 Area/Districts	N	Mean	Std. Deviation	F	Sig.
Muzzafarnagar	60	4.08	.926		
Kanpur	60	3.97	1.025		
Agra	60	4.18	.748		
Allahabad	60	4.07	.756	1.981	0.081
Varanasi	60	3.65	1.582		
Gorakhpur	60	4.12	1.027		
Total	360	4.01	1.056		

From the above data it is inferred that the mean value for the districts Agra & Gorakhpur are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that significant difference exists across areas in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies in U.P., have stand valid on the basis of areas.

Hypothesis H 9 b: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various age groups .

Q9 Age group	N	Mean	Std. Deviation	F	Sig.
Upto 30	35	4.14	1.033	0.975	0.421
31-40	88	3.85	1.130		
41-50	107	3.99	.966		
51-60	86	4.06	1.202		
More than 60	44	4.18	.786		
Total	360	4.01	1.056		

From the above data it is inferred that the mean value for the age group more than 60 years & upto 30 years are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across age groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that expectation that Power deficit can be reduced by addition of power generation capacity by private companies stands valid by all age groups.

Hypothesis H 9 c: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various occupations.

Q9 Occupation	N	Mean	Std. Deviation	F	Sig.
Service	206	4.02	1.152	0.531	0.713
Business	73	4.03	.799		
Teaching-std	32	3.91	.995		
Housewife	12	3.67	1.155		
Rtd from service	37	4.14	.976		
Total	360	4.01	1.056		

From the above data it is inferred that the mean value for the group of Rtd from service & business /service groups are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across various occupation groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies.in U.P, stands valid by all occupation groups.

Hypothesis H 9 d: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various income groups.

Q9 Income group	N	Mean	Std. Deviation	F	Sig.
Upto Rs 10000	54	4.02	1.055	0.301	0.877
Rs 10000-20000	99	3.94	1.260		
Rs 20000-35000	72	4.01	1.028		
Rs 35000-50000	71	4.00	1.014		
More than Rs 50000	64	4.12	.766		
Total	360	4.01	1.056		

From the above data it is inferred that the mean value for the income groups more than Rs 50000 & upto Rs 10000 are on higher side than others.

In view of the ONE WAY ANOVA test conducted the significance value is > 0.05 and therefore it is inferred that no significant difference exists across income groups in the statement made and therefore the null hypothesis is accepted.

In the perspective of the inference made it is concluded that in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies in U.P., stands valid by all income groups.

The results of the above hypothesis are summarized in the following tables :

Table 4.5 Summary of hypothesis testing H (1)

Null Hypothesis statement	Significance value	Condition	Null Hypothesis
Hypothesis H1 a: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H1 b: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various age groups.	0.154	Significance value is > 0.05	Accepted
Hypothesis H1 c: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various occupation.	0.357	Significance value is > 0.05	Accepted
Hypothesis H1 d: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various income groups.	0.009	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that market driven price mechanism can be an option to improve upon the availability and reliability of power in Uttar Pradesh stands valid by age group and occupation however has varied opinion on the basis of areas/districts and income group.

Table 4.6 Summary of hypothesis testing H (2)

Hypothesis H2 a: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H2 b: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various age groups.	0.04	Significance value is < 0.05	Rejected
Hypothesis H2 c: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various occupations.	0.394	Significance value is > 0.05	Accepted
Hypothesis H2 d: There is no significant difference in the mean value in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various income groups.	0.002	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in Uttar Pradesh stands valid only by different occupation group, however has varied opinion on the basis of areas/districts, age group and income group.

Table 4.7 Summary of hypothesis testing H (3)

Hypothesis H3 a: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various areas/districts.	0.123	Significance value is > 0.05	Accepted
Hypothesis H3 b: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various age groups.	0.30	Significance value is > 0.05	Accepted
Hypothesis H3 c: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various occupation.	0.868	Significance value is > 0.05	Accepted
Hypothesis H3 d: There is no significant difference in the mean value in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts across various income groups.	0.255	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Large size plants/further capacity addition of power plants will have environmental impacts stands valid by all the groups of respondents and do not have any difference of opinion on the basis of areas/districts, age group, occupation and income group.

Table 4.8 Summary of hypothesis testing H (4)

Hypothesis H4 a: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H4 b: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various age groups.	0.392	Significance value is > 0.05	Accepted
Hypothesis H4 c: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various occupation groups.	0.859	Significance value is > 0.05	Accepted
Hypothesis H4 d: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system across various income groups.	0.124	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that due to high capital investment there may be rise in tariff under open market (non- subsidized pricing) system in Uttar Pradesh, stands valid by occupation, age group and income group however has varied opinion on the basis of areas/districts.

Table 4.9 Summary of hypothesis testing H (5)

Hypothesis H5 a: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various areas/districts.	0.00	Significance value is < 0.05	Rejected
Hypothesis H5 b: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization ,across various age groups.	0.035	Significance value is < 0.05	Rejected
Hypothesis H5 c: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization across various occupation.	0.341	Significance value is > 0.05	Accepted
Hypothesis H5 d: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization , across various income groups.	0.000	Significance value is < 0.05	Rejected

In view of the analysis of results of the above hypothesis on demographic parameters it is observed that in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization , stands valid by occupation, however has varied opinion on the basis of areas/districts , age group and income group.

Table 4.10 Summary of hypothesis testing H (6)

Hypothesis H 6 a: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various areas/districts.	0.049	Significance value is < 0.05	Rejected
Hypothesis H 6 b : There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option , across various age groups	0.028	Significance value is < 0.05	Rejected
Hypothesis H 6 c: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various occupations.	0.449	Significance value is > 0.05	Accepted
Hypothesis H 6 d:There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option, across various income groups.	0.183	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that that Pricing of power based on price band method for the amount of power consumed (initially subsidized up to a certain level and subsequently on actual market price, non- subsidized mechanism) is a better option stands valid by occupation and income group however has varied opinion on the basis of areas/districts & age group.

Table 4.11 Summary of hypothesis testing H (7)

Hypothesis H7a: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations , across various areas/districts.	0.000	Significance value is < 0.05	Rejected
Hypothesis H7b: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various age groups.	0.059	Significance value is > 0.05	Accepted
Hypothesis H7c: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various occupations.	0.085	Significance value is > 0.05	Accepted
Hypothesis H7d: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various income groups.	0.250	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations stands valid by occupation, age group and income group however has varied opinion on the basis of areas/districts.

Table 4.12 Summary of hypothesis testing H(8)

Hypothesis H 8 a: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various areas/districts .	0.00	Significance value is < 0.05	Rejected
Hypothesis H 8 b: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various age groups .	0.633	Significance value is > 0.05	Accepted
Hypothesis H 8 c: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various occupations.	0.378	Significance value is > 0.05	Accepted
Hypothesis H 8 d: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various income group.	0.030	Significance value is < 0.05	Rejected

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P., stands valid by occupation, age group however has varied opinion on the basis of areas/districts and income group.

Table 4.13 Summary of hypothesis testing H (9)

Hypothesis H 9 a: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various areas/districts.	0.081	Significance value is > 0.05	Accepted
Hypothesis H 9 b: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various age groups .	0.421	Significance value is > 0.05	Accepted
Hypothesis H 9 c: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various occupations.	0.713	Significance value is > 0.05	Accepted
Hypothesis H 9 d: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various income groups.	0.877	Significance value is > 0.05	Accepted

In view of the results of the above hypothesis on demographic parameters it is observed that in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies in U.P., stands valid all occupation, age group and income group and areas/districts.

Consumer's behavior on increase of marginal price:

Consumers are willing to pay a marginal increase in price if the quality and availability of power is ensured from moderately better to very good.

Q) for very good quality power supply

Q) for moderately good quality power supply

N Parametric test for questions relating to end consumer's behavior on very good quality power supply

Frequencies

Q2

	Observed N	Expected N	Residual
Rs 1	161	72.0	89.0
Rs 2	110	72.0	38.0
Rs 3	53	72.0	-19.0
Rs 4	16	72.0	-56.0
Any other value	20	72.0	-52.0
Total	360		

From the frequencies it can be inferred that there is large number of consumers (94.4 %) who are willing to pay *at least* a marginal increase in price upto Rs 1 from the present charges for a very good quality power. There is a significant number of consumers (about 50 %) who are willing to pay an increase of at least Rs 2 for the same.

N Parametric test for questions relating to end consumer's behavior on moderately good quality power supply

Frequencies

Q3

	Observed N	Expected N	Residual
Rs 1	168	72.0	96.0
Rs 2	81	72.0	9.0
Rs 3	13	72.0	-59.0
Rs 4	6	72.0	-66.0
Any other value	92	72.0	20.0
Total	360		

From the frequencies it can be inferred that there is large number of consumers (74 %) who are willing to pay a marginal increase of at least Rs 1 from the present charges for a moderately good quality power. There is a significant number of consumers (27 %) who are willing to pay an increase of at least Rs 2 for the same.

For the Hypothesis first to four the questions the survey was conducted electronically to power generating companies the outcome was taken through the Google Docs and was analyzed taking the mean value for the questionnaire scaled from 1 to 5 for various aspects of private sector participation such as, factors affecting sustainability, Problems / Challenges & Aspects related to Policies of the Government of Uttar Pradesh.

Chapter-5

Conclusions, Recommendations & Directions for Future Research

Chapter-5

Conclusions , Recommendations & Directions for Future Research

In view of the outcome of the survey administered to power generation companies and to the end consumers of power, the following are the conclusion, recommendation and direction for future research.

5.1 Conclusions

It is inferred that among the factors affecting sustainability the issues of implementation of government policies, modernization of transmission and distribution, adoption of alternate sources and future demand due to population growth are significant. Besides this, investment cost, fuel cost, operation & maintenance cost and modernization of transmission & distribution would have a significant impact on the sustainability of private sector power generation. Whereas government being single buyer is impacting conversely on the sustainability of private sector power generation there are brighter prospects due to the fact that an increasing trend of population growth with rising trend of economic growth in U.P. would significantly increase consumption of Electricity (power). It is also expected that private companies have a significant cost benefit if they undertake gas based power projects.

On the other side of the coin the problems relating to these prospects are also significant as is also evident from the survey. Risk of timely payment by distribution companies in U.P. would significantly impact privatization. Inadequate infrastructure is one of the reasons that would significantly hinder the privatization process particularly relating to Inefficient transmission and distribution capacity. Fuel supply problems, land acquisition problems, nonpayment of power generation, inadequate cost recovery and bias of state regulators for public sector corporations would significantly hinder the privatization process. Apart from these intervention by NGOs, load shedding & geopolitical risk in case of coal asset acquired abroad would significantly impact the potential of growth of private sector power companies. It is expected that Simplification of procedure, reduction in administrative delays, End of License Raj regime & Improvement in overall policies of the Government would have a significant positive impact on the private sector participation in power generation and supply in

U.P. It is also prudent for power generation companies to have backward integration of fuel supply & producing electricity through renewable energy sources for sustainable growth in U.P.

5.1.1 Issues Relating to Power Generation Companies :

1) Related to sustainability of private sector participation in power generation in Uttar Pradesh

From the survey administered to the private sector power generation companies it is inferred that implementation of Govt. policy participation has very significant impact on sustainability of private sector. Though less impacting Investment cost would have significant impact on the sustainability of private sector participation in power generation.

Fuel cost has been considered to be having very significant impact on the sustainability of private sector power generation, the operation & maintenance cost would have also have significant impact on the same. Modernization of transmission & distribution would have as significant impact on the sustainability of private sector power generation as Govt. being single buyer is impacting conversely on the sustainability of private sector power generation.

An increasing trend of population growth in U.P. would more significantly on future demand for Electricity (power) compared to the rising trend of economic growth in U.P. It is also inferred that Private companies have a significant cost benefit if they undertake gas based power projects.

2) Related to problems and challenges that confront private sector participation in power generation in Uttar Pradesh

Risk of timely payment by distribution companies in U.P. would significantly impact privatization has been rated to be very high on the Likert scale (4.75) which seems to be the biggest problem among all problem and challenges . Whereas land acquisition problems, fuel supply problems, inadequate infrastructure & inadequate cost recovery are the few factors which would significantly hinder the privatization process it is inferred that lack of knowledge

and experience by private entrepreneurs would not significantly hinder the privatization process.

. The statement "*Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process*" has *a mean value of 2.94 (less than 3.0) and therefore inferred that it has not been accepted by the private power generating companies and concluding thereby "Private Power generating companies have the competency of their domain and therefore this factor would not hinder the privatization process".*

Inefficient transmission and distribution capacity & nonpayment of power generation bill would significantly hinder the privatization process. Bias of state regulators for public sector corporations or against private sector companies & load shedding would seem to be equally and significantly impacting the privatization process the potential and growth of private sector power companies. Geopolitical risk in case of coal asset acquired abroad and the intervention by NGO s would also have significant impact on privatization process.

3) Related to role and impact of Government policies relating to private sector participation in power generation in Uttar Pradesh

The following factors have been observed to be very significant which are related to the role and impact of government policies (all have mean value at least 4.0 or above).

Financial promotional and fiscal incentives, improvement in administrative & beaurocratic functioning, simplification of procedure, reduction in administrative delays, improvement in overall policies of the Government and end of License Raj regime.

4) Related to measures by which private sector participation in power generation can be improved in Uttar Pradesh

It has been observed that two major factors which have importance in improving the private sector participation have been considered to be significant are backward integration of fuel supply which would have significant impact on fuel security and prospects relating to producing electricity through renewable energy by private companies.

5.1.2 Issues Relating to End Consumers : The exclusive survey of end consumer(s) has concluded that

1) For the hypothesis that Market driven (non -subsidized) price mechanism can improve the availability and reliability of power in U.P. when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by all age groups & occupation however there was varied opinion on the basis of areas/districts & income groups .
2) The hypothesis based on the statement that Immediate privatization of power generation and distribution would improve power generation & distribution of power supply in U.P. when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by all occupation however there was varied opinion on the basis of areas/districts, income groups and age groups.
3) For the hypothesis based on the statement that Large size plants/capacity addition of power plants will have negative environmental impacts when analyzed on the demographic parameters revealed that based on the mean value was very well accepted and stands valid by all age groups , occupation , areas/districts & income groups .This also reveals that there is a general awareness among people of all groups on such vital issue of environmental concern.
4) For the hypothesis based on the statement that, with high capital investment there is a likely of increase tariff in open market of power generation when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation, income groups and age groups however there was varied opinion on the basis of areas/districts.
5) For the hypothesis based on the statement that Privatization would not have any effect on subsidies provided for household consumers when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation however there was varied opinion on the basis of income groups areas/districts and age groups.
6) For the hypothesis based on the statement that Privatization would result on pricing of power based on price band method for the amount of power consumed initially subsidized upto a certain level and subsequently on actual market price (non -

subsidized) mechanism when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation & income groups however there was varied opinion on the basis of areas/districts and age groups.

7) For the hypothesis based on the statement that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation, income groups and age groups however there was varied opinion on the basis of areas/districts.

8) For the hypothesis based on the statement that Privatization for transmission / distribution followed by before privatization of power generation in Uttar Pradesh would be beneficial for consumers when analyzed on the demographic parameters revealed that based on the mean value it is accepted and stands valid by various occupation & age groups however there was varied opinion on the basis of areas/districts and income groups.

9) For the hypothesis based on the statement that Privatization would have the impact of reducing power deficit through the addition of power generation capacity by private companies when analyzed on the demographic parameters revealed that based on the mean value it was very well accepted and stands valid by all age groups , occupation , areas/districts & income groups.

5.2 Recommendations

Many assume that reforms will cut costs and lead to lower tariffs which is not the case in reality. In fact, the fundamentals are different at conclusion in the industry point of view and opposite to the perception for at least two reasons. First, the SEBs are increasingly purchasing power from non-SEB generators and these new power purchases are more costly than the incumbent SEB supply. Second and closely related, is that greater transparency and unbundling of the functions of the electric power system will reveal fully the need to lift tariffs so that each link in the power chain generation, transmission and distribution is viable. In view of the tariff fixation the policy would be required to support market driven price mechanism which may not be acceptable to the end consumers in large, however a middle way of moving ahead in this

direction can be the implementation of tariff plans as per price band method which is a more practical approach in moving towards the market driven price mechanism. Adoption of this methodology of tariff in which a fixed amount of power can be at a lower price band and as it goes high for any consumer the premium of that may go high for higher range of consumption. Following are the major thrust areas/issues for effective private sector participation and to achieve the bigger objective of reliable, cost effective and quality power to all. The following are the recommendations of the above study.

5.2.1 Related to Problems & Challenges that confront Private Sector Participation

Among the problems and challenges being faced are issues of risk of timely payment by distribution companies, infrastructure problem, inefficient transmission & distribution system and land acquisition problem. In the survey administered to the private sector power generation companies the issue of timely payment has been observed to be the most significant factor that impacts private sector participation. In view of this, it is recommended that the Government of Uttar Pradesh may take up such reform process which ensures timely payment by distribution companies. In the other survey administered to the end consumers it has been observed that the hypothesis which relates to the privatization of transmission and distribution (even before that of generation) has been supported by various age group and occupation (though have varied opinion on the basis of area and income group). Fuel supply problem has also been considered significant among such issues. Bias of state regulator against private sector, land acquisition problems, inadequate cost recovery, nonpayment of power generation bill and load shedding are other such important issue which needs to be addressed by the Government of Uttar Pradesh immediately in order to have successful reform process and to remain attractive for future investments by private sector companies. It may be noted that the private sector power producers do not significantly acknowledge the lack of knowledge & experience by private entrepreneurs which shows high confidence that the private producers can efficiently manage new power projects. Therefore the following factors should be immediately addressed by the Government of Uttar Pradesh in view of the problems and challenges being faced by power generation companies to pave the way for their investment in power generation projects in Uttar Pradesh.

a) Timely payment by distribution companies
b) Ensuring ways and means of adequate cost recovery
c) Addressing land acquisition problems
d) Improving Infrastructure and modernization of Transmission and distribution
e) Ensuring unbiased state regulator for power sector

5.2.2 Related to Policies of the Government (Reform process)

There has been a large variation in the performance of the states and reforms alone do not indicate success in terms of loss reduction or efficiency. This variation was observed due to the fact that some states were choosing to privatize distribution, some simply unbundling the SEBs, and others keeping the SEBs intact while adopting organizational reforms aimed at improving economic efficiency. The main factor in explaining outcomes is the ability of the state governments to implement reform (or operational improvement) plans and the strength of their institutions. Governments with weak institutions have performed poorly even when they had ambitious reform plans, as in Orissa. Governments with strong institutions and sustained commitment to reform (e.g., Andhra Pradesh and subsequently Delhi) have fared much better. In general, reforms have increased the average costs at the SEBs at a rate higher than the increase in revenues, primarily because reforms have forced a shift to greater reliance on non-SEB generators whose costs include commercial rates of return. New generators have long-run marginal costs that are higher than the costs SEBs saw in the past and it is estimated that reforms in distribution and transmission will also force a rise in tariff to meet the statutory profitability. A financially sustainable system must have higher end tariffs, however there are expected improvements in operation due to better management and therefore a competitive and cost effective economically viable solution can be in place.

The situation requires intense and urgent efforts on the part of the public-interest organizations to take up challenges thrown up by the reform process in general and the regulatory processes in particular. Hence, in response to the increased pace of the reform and regulatory processes, it is necessary that these individuals and organizations should come together, share experiences, and learn from each other. It must, however, be remembered that there is considerable diversity in the functioning of the state regulatory commissions and even

in the techno-economic, political, institutional and historical contexts in different states. It is therefore required that following areas must be improved by the Government of Uttar Pradesh to encourage private sector participation and make the power sector viable and efficient.

a) Simplification of procedures
b) Reduction in administrative delays and decision making
c) Elimination of multiplicity of clearance
d) Recovery of revenue
e) Other aspects of the reform process which need to be in place concurrently and consistently
f) Restructuring of legal issues should be well before in place.

5.2.3 Related to Factors Affecting Sustainability

In view of the potential to grow and with the advent of new technologies and changing economic scenario across globe, the power sector may lead towards a market driven mechanism of tariff fixation. This will not only make the Government free from the burden of subsidy but explore the potentials of market driven economics in the country. In the survey administered to the end consumers of power the hypothesis 'Market driven (non-subsidized) price mechanism can be the option to improve upon the availability and reliability of power in U.P.' was accepted by all age group and occupation, however had varied opinion on the basis of area and income group. When considered on the basis of price band method (initially subsidized upto a certain units and subsequently on market price mechanism) , the statement was in agreement with various occupation and income group. It was also understood that for the hypothesis relating to privatization of transmission & distribution to be done before that of generation was in agreement with various age group and occupation however has varied opinion on the basis of area and income group. In the same survey the hypothesis relating to rise in tariff under open market (non subsidized pricing) system due to high capital investment was acknowledged by all occupation, age group and income group however had varied opinion on the basis of area/districts.

Environmental considerations have not played a major part of Indian reforms, although the net effect of reforms has probably been positive for the environment. Reform is probably reducing losses in the power system, which will lower emissions per unit of energy actually delivered. In generation, reform is probably encouraging the construction of more efficient plants. A major improvement for the environment is found in the rise of natural gas, a trend that is due to many factors largely unrelated to reform, such as new gas finds and improvements in gas-fired generation technologies. In response to the survey administered to the power generation companies it has emerged as one of the significant aspects of sustainability if the private power generation companies take up the gas based power plants. Also in the survey administered to the end consumer all the respondents have considered this aspect as an environmental consideration. It is recommended that all potential private sector players must ensure their fuel security by having own assets or long term agreements with suppliers to ensure fuel security and remain competitive in the market.

The problems related to power sector which needs to be addressed immediately, especially with respect to sustainability and generation deficit are

a) Economically viable price mechanism
b) Issue of subsidy
c) Cost of supply versus realization,
d) Remedial for utilities which are bleeding money
e) Wasteful consumption in irrigation and
f) Capacity addition to overcome power deficit.

In view of the above study it is inferred that large potential exists across the state of Uttar Pradesh which is in want of energy so as to cope up with the increase in population growth and industrial growth as has also emerged in the survey administered. Policy changes as are being notified by the Government of Uttar Pradesh from time to time which are welcome move and are the need of the hour.

5.2.4 Related to Measures by which Private Sector Participation could be increased

The National Electricity policy 2005 has been made in view of making accelerated development of the power sector which should have an impact on economics of generation using different resources. The National Tariff Policy 2005 was aimed to devise a better tariff structuring system in place and therefore an attractive tariff for players As discussed in the literature review section, Ernst &Young (2012) undertook a survey of various sectors to determine the overall outlook for India which turned out to be remains positive. However, it was found through the survey that inadequate infrastructure and a lack of governance and transparency were the major obstacles to investment in power sector. The report concludes that by improving upon these obstacles will result in an improvement in India's attractiveness for investment. The Government, though sensitive to the challenges, has to hasten policy-making and implementation, so that India continues to remain attractive. Kintanar Noel Eli B., et.al. (2003) have described how the Government of the Philippines continues to pursue its policy of encouraging the private sector to participate in the financing, construction, management and operation of infrastructure services and facilities in the country. Besides key factor as discussed above the following are some important measures by which private sector participation can be increased.

a) Tariff structure revision with
b) Link to market driven price mechanism
c) Mode of participation such as BOOT concept

The tariff structure also needs to be designed in a more structured way depending on the time of tariff. In any power system, especially in India, during the late night and early hours of the day, say from 10 pm to 5 am, the power supply is in excess of demand, while during the morning hours supply is inadequate to meet the demand. During certain hours like 6 pm to 9 pm the demand is the highest due to the lighting needs of households and commercial establishments and these are called the peak hours. The tariff structure can be modified based on the peak hour and normal (non- peak) hour. In terms of the market driven price mechanism which may not be acceptable to the end consumers in large, a middle way of moving ahead in

this direction can be the price band method which is a more practical approach in moving towards the market driven price mechanism.

5.2.5 Mode of Private Sector Participation

It is also understood from the study that private sector participation would lead to better competition among the private players and public sector utilities would also be forced for adoption of such management to remain competitive. The concept of BOOT can work very well as these have been well experienced in other infrastructure sector. It is also advisable to the power sector players to have their fuel linkages and fuel security plans in place before entering in power generation sector. Also the fuel opted would have their environmental concerns which needs to be separately addressed in view of MoEF guidelines. From the response of private sector power generating companies, it has also been inferred that

a) Best Public - Private Partnership in case of a joint venture is 49-51 % which mean for such participation between public and private partnership the management control has to be in the hands of private sector.
b) As regards the Equity participation between foreign & Indian company in power generation there are varied opinion on the composition of equity participation however it has been observed that 30-70% and 49-51 % composition has been preferred by private sector power generators.
c) For the alternative mode of Private Sector of participation BOOT concept has been widely agreed.

The role of the private sector remained quite limited in past years. Slowly but gradually the role of private sector in power generation is increasing and thus competition is being experienced by the existing players. The domineering of executing Power projects on time without cost escalation and operating the power plant at a superior performance level have forced the new generating organizations to identify areas of improvement to enter the field and remain competitive.

On the basis of extensive literature review, the following approach is being recommended for private sector participants /JVs for setting up of a new power plant, especially for new organizations/entrants.

a) **Location**: The project should be planned near to the load center to avoid loading of transmission charges , however in case of proximity to fuel source the merit has to be seen in that perspective.
b) **Fuel Mix**: In case of gas based power plant a fuel mix with RLNG upto 20 % with domestic gas may work, however in case of high LNG prices the economics may not work and then alternative fuel such as coal may be considered.
c) **Scale of operation**: For gas based plants it is advisable to set up power plants in Combined Cycle Power Plant (CCPP) which has higher efficiency and thus gives effective cost benefits. The plant size should be of medium scale upto 500 MW as an initial venture.
d) **Technology:** It is recommended that for base load operations combined cycle gas turbines may be used, however for peak load operations gas engines may be used. Depending upon the cost of power generation and CERC guidelines a combination of these may be used.
e) **Development model & marketing:** It is preferred to make joint ventures with strategic business partners who are already an established player in the field of power generation in any part of the globe; this gives the leverage of having core competency of promoter(s) besides having a project management consultant. For the marketing of the power thus produced, long term/ short term power purchase agreement has to be in place with some major utilities.

In the above perspective it may be worth considering that the prospects of decentralized medium size power generation units may once again be seen and for upcoming projects the BOOT concept may work.

5.3 Directions for Future Research

Based on the above research, following directions have been pointed out for future research

1. Future researchers may expand the scope of study to other geographical region of India or other Indian states or other region of the world where it may deem suitable and worthy to conduct the research work.
2. Further research may be carried to explore other / additional important factors or decision making variables.
3. The present private sector power generation is in nascent stage in various Indian states, with the upcoming technology and globalization it may happen easily that private power producers may take competitive advantage and thereby bringing the private sector participation to a greater extent which may be studies in further research. Bringing the cost of power to lower side is presently not viable in the current scenario however with the advent of new technologies it may happen in future. In view of that various other issues relating to private sector participation may crop up.
4. Future research may treat this as a service industry wherein multiple service providers may be available and accordingly the service quality may also be studied for various regions or private power generation companies.

Bibliography

1. Ada Karina Izaguirre (1997), Private participation in Electricity sector-Recent trends, *World bank - private participation, Infrastructure group. (www.worldbank.org/html/fpdl/otes/ notelist.html).*

2. Annual Report (2011-12), Working of state power utilities & Electricity Departments , *Planning Commission , Govt of India ,Oct 2011*

3. Anoop Singh,(2005) Private Investment in Power Sector in Developing Countries: Lessons from Reforms in Asian and Latin American Countries, *Deptt. of Industrial and Management Engg ,IIT Kanpur, P-1*

4. Antonette D'Sa and K.V.Narasimha Murthy (2002), Karnataka's Power Sector & Suggested Ways Forward. *International Energy Initiative*

5. Antonette D'Sa, K.V.Narasimha Murthy and Amulya K.N.Reddya (1999),India's Power Sector Liberalization: *An Overview, p-2 , 7-10*

6. Balachandra, P. (2006), Implications of private sector participation in power generation a case study from India.

7. CRISIL research Outlook 2007-08 to 2011-12 : *Sector : Power*

8. CRISIL research on Power – Annual review *(Aug 2009), p-A1*

9. CRISIL research : Sector focus Power – *Customized Research bulletin (Oct 2010), p-4*

10. Cropper Maureen L, Alexander Limonov, Kabir Malik, and Anoop Singh, (2012) , Estimating the Impact of Restructuring on Electricity Generation Efficiency: *The Case of the Indian Thermal Power Sector May 1, 2012, p-2*

11. Central electricity Authority, June 2011: Growth of Electricity Sector in India from 1947-2011, *Government of India, Ministry of Power. (http://powermin.nic.in/)*

12. Celine Paton, (2012) Greater Private Sector Participation and Renewable Energy Development to Back Moroccan Electricity Industry Growth *: Energy & Power Systems Research Analyst at Frost & Sullivan , Published: 15 Apr 2012, pp: 1-2*

13. Clive Harris (2003), Private Participation in Infrastructure in Developing Countries Trends, Impacts, and Policy Lessons - *World bank working paper #5*

14. Clive Breggs, Energy Management Supply and conservation. Competition in Energy Supply: *The UK electricity experience, (Chapter 3-textbook)*

15. Clean and green energy development of wind power in AP (July 2007): *Govt of Andhra Pradesh*

16. Compendium of State Government Policies on Renewable Energy Sector in India (Edition 2010)

17. Commission staff working paper interpretative note on directive 2009/72/EC concerning common rules for the internal market in Electricity and directive 2009/73/EC concerning common rule for the internal market in natural gas the unbundling regime *: European Commission, pp:5-30*

18. David G. Victor and Thomas C. Heller, (2006) The Political Economy of Power Sector Reform*: The Experiences of Five Major Developing Countries* www.cambridge.org *,pp- ii/xv Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK*

19. Debjoy Sengupta, (2012) India's total power generation capacity crosses 200 Giga watt in 11th plan period *, ET Bureau Jun 3, 2012,*

20. Deptt. of Science and Technology ,Government of Punjab New and Renewable Sources of Energy (NRSE) Policy –Nov 2006,.

21. Electricity Sector Reforms and Private Participation Experiences, Lessons, and Outlook*: Dissemination Workshop Asian Institute of Management (AIM) Makati City, Metro Manila, Philippines 5-6 November 2003*

22. Energy Policy of UP (2009), Government of Uttar Pradesh.

23. Ernst & Young's 2012 attractiveness survey ,India , Growing Beyond Ready for the transition*: Web edition, (http://emergingmarkets.ey.com) p-2*

24. Evaluating Power Sector Reforms, 10th India Power Forum, Sept 2007, *ICRA Management Consulting Services Limited New Delhi.*

25. F. A. Vandrevala, (2003) Power – Challenges and opportunities , presentation of CII Goa Seminar , *Tata power Company , July 2003 Profile and challenges - North Eastern and Eastern States of India- 3rd North East and East Power Summit 2010 ,Indian Chamber of commerce*

26. Four new hydropower projects for Uttar Pradesh , Government of Uttar Pradesh , *HP Bureau,23rd Aug 2012. Growth of Electricity Sector in India from 1947-2011, Government of India, Ministry of Power, Central electricity Authority, June 2011. (http://powermin.nic.in/)*

27. Girish Sant, Shantanu Dixit, and Subodh Wagle , (1997) SEB Privatization Transcending the Issue of Ownership October 04, 1997 , *Economic and political weekly. Vol - XXXII No. 40,*

28. Generation of Electricity through Non – Conventional Energy Sources,(2006) *Government of Madhya Pradesh*

29. H.L Mukunda DCA, KPTCL & Vasuki, (2010) Karnataka Power Sector Reforms -Issues in Restructuring, *Dhiya consulting Pvt. Ltd. August 23, 2010*

30. Harish K Ahuja , (2010) Reforming power sector reforms – Multiple conflicts , democratic solution , *Excel books publication Hydro Power Policy – 2006, Government of Himachal Pradesh*

31. Harnessing the power of the Heavens , (2003) State policy for the development of small hydropower in J&K , *Jammu & Kashmir State Power Development Corporation Limited*

32. Hydro Power Policy (2006), Government of Himachal Pradesh

33. Irrigation & CAD department guidelines for establishment of mini hydel power projects along vagus and streams (July 2007) , *Govt of Andhra Pradesh*

34. Indian Power sector-Inside out of power sector (2012), Power companies, *accessed through web Feb 2012 (www.indianpowersector.com)*

35. *India Energy Sector, Regulatory and policy environment, D&B report (2008), Accessed through web July 2010* www.dnb.com

36. *Indian power sector an overview (2012) — Presentation Transcript SlideShare Inc. Accessed through web Feb 2012*

37. *Indian Power Sector Analysis , RNCOS, accessed through web Feb 2012* www.marketsmonitor.com

38. *Infrastructure action development plan for Chhattisgarh (2000.): Status of Power reforms in different states.*

39. Ijlal Naqvi; Access to Power (2012.): Governance and Development in the Pakistani Electrical Power Sector *Assessed through Udini Proquest (http://udini.proquest.com/preview) 2012*

40. Indian power sector analysis report by Report Buyer : key issues (2012) , *Accessed through web, 2012* www.reportbuyer.com/energy utilities

41. Indian Power Sector in Transition Mode NBM & CW, August 8, 2012 *Newspaper Article , Athena Information Solutions Pvt. Ltd , Assessed through Udini Proquest (http://udini.proquest.com/)*

42. Incentive policy for the development of small hydro power projects in Madhya Pradesh (2006)

43. Indian infrastructure (April 2012): Building on its integrated presence in the power sector

44. Infra-line Energy (Jan 2012): Energy efficient market in India: A $ 16 Billion opportunity

45. India Outlook-2012 , *D&B report*

46. Jaideep Deogharia (2012), Jharkhand State Electricity Board unbundling likely by year-end, *TNN Jun 17, 2012*

47. John Byrne, Leigh Glover, Hoesung Lee, Young-DooWang and Jung-Min Yu (2004) Electricity Reform at a Crossroads: Problems in South Korea's Power Liberalization Strategy*: Pacific Affairs Vol. 77, No. 3, The Political Economy of Electricity Reform in Asia (Fall, 2004)*

48. Karnataka Renewable Energy Policy 2009-14, *Government of Karnataka Jan 2010.*

49. KSEB , April 2009: NHPC plans to enter into thermal power generation ,

50. Major boost for power sector: Project monitor , July 2007 , *accessed through Web June 2009, www.projectsmonitor.com*

51. Memorandum of Understanding between Ministry of Power, Government of India and the Government of Uttar Pradesh, Feb 2000.

52. Ministry of power document on Power projects yielding benefit during the XIth Plan & summary statement, *Accessed through web www.powermin.nic.in*

53. *Mode of Private Participation in the Power Sector : ADB (Asian development bank) Institute report, (http://www.adbi.org/discussion-paper/2007/04/26/2236.policy.environment.power.sector/mode.of.private.participation.in.the.power.sector/) Accessed thru web Sept 2010*

54. Nakul Correa (1999) : Unbundling and Deregulating Electric Power in Tamil Nadu, *India November 1999*

55. New policy for power generation from non-conventional sources of energy -2008, *Govt of Maharashtra.*

56. Niranjan Swain et. al. (2004), Analysis of power sector in India , A structural perspective *The ICFAIan journal of management , ICFAI University press (Nov 2004) pp 49,50*

57. Navroz K. Dubash and Sudhir Chella Rajan (2001): The Politics of Power Sector *: Reform in India, World Research Institute,. April 2001,*

58. Noel Eli B. Kintanar, Ma. Lourdes S. Baclagon, Rodolfo T. Azanza, Jr. and Rina P. Alzate (2003),*Locking private sector participation into infrastructure development in Philippines , Transport and Communications Bulletin for Asia and the Pacific No. 72, 2003*

59. Newbery D M (1999) Privatization, Restructuring and Regulation of Network Industries, *Cambridge, Mass.: MIT Press.*

60. Over view of wind energy potential (2008) , Tamilnadu energy development agency

61. Puneet Chitkara, Rajiv Shekhar, and Prem K. Kalra. (2001), Missing interconnections in the power sector, *Indian Infrastructure Report 2001, p-98.*

62. Pillai N., Vijayamohanan (2008): Power Sector Reform: Some Lessons for Kerala, (Unpublished). *From abstract*

63. Pollitt (1995) Ownership and Performance in Electric Utilities, *Oxford University Press, Oxford*

64. Parker, D. (2002), 'Economic Regulation: A Review of Issues', *Annals of Public and Cooperative Economics, 73 (4), pp.493-519.*

65. Philip Gray (2001), Private Participation in Infrastructure: A Review of the Evidence Private Provision of Public Services Group Private Sector Advisory Services(2001) *Power generation overview : Indian infrastructure May 2012*

66. Policy guidelines for development of wind power in Kerala (2007) through private developers, *Govt of Kerala, May 2007.*

67. Public private partnership in India, Ministry of Finance, Government of India (2008-2009), *www.pppinindia.com/industries.php*

68. Policy for promoting generation of Electricity through renewable energy sources (Nov 2005) *Haryana Government ,*

69. Profile and challenges - North Eastern and Eastern States of India- 3rd North East and East Power Summit 2010 ,*Indian Chamber of commerce*

70. Power generation overview : Indian infrastructure May 2012

71. Public private partnership in infrastructure development, UNESCAP and the Ministry of Planning and Budget, *Republic of Korea, Seoul October 2007,*

72. Power sector reforms can rule out blackouts , The New Indian Express *,01 August 2012*

73. Power sector reforms in Orissa (2002) : Lessons for other states in India, *Public private infrastructure advisory facility ,www.ppiaf.org*

74. Policy for Promotion of Private Sector Investment for setting up of Power Generation Projects in the State of Rajasthan *(Sept 2005), Energy Department Government of Rajasthan ,*

75. Policy for promotion of Electricity from wind. 2003 , *Government of Rajasthan, April 2003*

76. Policy for promoting generation of Electricity from Biomass (2010) *Energy Department , Government of Rajasthan , February, 2010*

77. Position paper on the power sector in India (2009), Department of Economic Affairs *Ministry of Finance Government of India,*

78. Power Investment Opportunity >Power Sector Overview (2009) : Invest India *Accessed through Web (www.investinindia.com/industry/power/)*

79. Power sector at a glance (2012) : Ministry of Power , *Central Electricity Authority*

80. Policy Guidelines on Power Generation from Non-Conventional Energy Sources (Dec 2005*). Govt of Orissa,*

81. Policy on hydropower development by private Sector (2002) : *Govt of Uttaranchal*

82. Policy for small hydro power development (March 2007) , *Government of Assam, Assam State Electricity Board*

83. Policy guidelines for private sector participation for developing non-conventional energy sources , *Govt of Bihar , Deptt of Energy*

84. Power Sector in India : White paper on Implementation Challenges and Opportunities –KPMG India *(2010) : Energy Summit, Nagpur - January 2010, p-1*

85. Policy directives on incentive to units generating power from non-conventional energy sources in Chhattisgarh Department of Energy, *Govt. Of Chhattisgarh (April 2002), p-1*

86. Policy directives on allotment of sites and incentives to small hydel projects upto 25 MW. Chhattisgarh State Renewable Energy Development Agency Department of Energy, *Govt. Of Chhattisgarh*

87. Policy for promotion of power generation from wind, Department of Energy, (2006) *Govt. Of Chhattisgarh*

88. Power sector reforms crucial for India: CII, Jan 2012 *accessed through web Feb 2012 (www.news24online.com/Power-sector-reforms-crucial-for-India-CII.)*

89. Power generation accelerates: Energy : Electricity, Monthly Review of the Indian Economy (2009) , *Centre for monitoring Indian Economy* ,

90. Policy for promoting generation of Power through Non-conventional Energy sources , *Government of Meghalaya*

91. Power policy for electrical power through non-conventional energy sources (2002-2003) , *Govt of Mizoram*

92. Private Sector Participation in the Indian Power Sector and Climate Change: *The Energy and resource Institute (TERI)*

93. Private plants to aid power generation rediff.com , February 28, 2007,*Accessed through web Sept 2010* ,

94. *Private Sector IPPs: Trends & Outlook, ICRA Rating Feature, July 2011, p-9*

95. Rahul Tongia et.al. (2003) The Political Economy of Indian Power Sector Reforms , *Working Paper #4 (Revised) December 2003.*

96. Rahul tongia et. al. Power Sector Reform India – The Long Road Ahead, (2003) *Carnegie Mellon University, Presentation (http://wpweb2.tepper.cmu.edu/ceic/SeminarPDFs/Tongia_CEIC_Seminar_4_8_03.pdf) accessed through web Sept 2010*

97. Rasmi Ranjan Das (2010),Introducing competition in the power sector in India: adoption of the US model- *Journal of Indian Business Research, 2010 Journal Article,ISSN: 1755-4195 Volume: 2 Issue: 2*

98. Ravi Krishnan, Krishnan & Associates (2012) Power in India: Opportunities and Challenges in a Fast-Growing Market *(ravi@krishnaninc.com) , July 1, 2012*

99. Report of McKinsey & Company (2007) Powering India : The road to 2017

100. Report and recommendation of the president to the board of directors on a proposed loan to the Power finance corporation Ltd. India (2002) *Asian development bank (RRP:IND31324) ,*

101. Reliance Energy bids lowest for Uttar Pradesh power projects, *Thaindian news, 13th June 2008, accessed through website.*

102. Review on Power Sector Reforms in Uttar Pradesh (2004), *Audit Report (Commercial) for the year ended 31st March 2004*

103. Recent outages underline need for power sector reforms: *Moody's review accessed through website, August 09, 2012.*

104. Research and Markets Adds Report: 'Power Generation Costs - Key to Determine the Best Energy Mix' Manufacturing Close - Up, *March 22, 2012 Newspaper Article , Assessed through Udini Proquest April 2012 (http://www.researchandmarkets.com/research/920dd292/power generation)*

105. Research and Markets: Indian Power Sector, Scenario Analysis - 2011 , Highlights the Major Opportunities Present in This Sector Today *,Business Wire,May 11,2001,Laura Wood, Research & Markets (http://www.researchandmarkets.com/research/9933ac/report_on _indian_p)*

106. Research and Markets Offers Report: 'Private Power Generation Opportunities in South Africa' Professional Services Close - Up, *February 2, 2012 Journal Article , Assessed through Udini Proquest (http://udini.proquest.com/)*

107. Research and Markets: Power Market in SAARC Countries to 2020 - FDI Driven by Private Sector Participation is Key to Future Growth Business Wire, May 15, 2012 , *Assessed through Udini Proquest (http://udini.proquest.com/)*

108. Report of The Working Group on Power for Twelfth Plan (2012-17) *Ministry of Power, Government of India , Jan 2012.*

109. Report of high level panel on financial position of distribution utilities , Ministry of Power, *Govt of India Chapter –IV, www.powermin.nic.in*

110. RFQ by Prayagraj Power Generation Company Limited, Nov 2008. *Investment opportunity in Uttar Pradesh Power sector,*

111. RK Kanga, (2006) Power sector in India: Challenges and opportunities; *Tata Power company presentation, July 2006.*

112. Role of states in implementing India's Electricity act 2003 (Sept 2005),*United States agency for International development (USAID) ,*

113. R. W. Bacon and J. Besant-Jones (2002) , Global Electric Power Reform, Privatization and Liberalization of the Electric Power Industry in Developing Countries , *Energy and mining sector board discussion paper series Paper No 2 June 2002.p-19*

114. Saraswata Mohapatra, (2010) "Sustainable Solutions by the Private Sector To India's Problems" *An essay, India : Future of change , Financial times, , University Of Delhi, , pp:1-2*

115. Shripad Dharmadhikary,(2009) Power Sector Restructuring: The Often Ignored Aspect of Water Sector Reforms , *Manthan Adhyayan Kendra, 7th Jan 2009 www.manthan-india.org*

116. Sihag A R, Neha Misra and Vivek Sharma , (2002) Impact of Power Sector Reform on Poor: A Case Study of South and South East Asia : *TERI, India , Accessed through web Feb 2012 (www.afrepren.org/project/gnesd/esdsi/teri.pdf)*

117. Sudheer Pal Singh (2009), SEB unbundling process nearing completion in most states/ New Delhi Nov 30, 2009, *Business standard publication accessed through website.*

118. Sukanya Ghosh, P.P. Sengupta, Biman Maity (2001) Evidence on the future prospects of Indian Thermal power sector in the perspective of deleting coal reserves, *Global Journal of business research ♦ Volume 6 ♦ Number 1, p-77*

119. Sonal Patel(2012) : India Revs Up Capacity with Massive Coal Plants , Power-Business and Technology for global generation industry. *1st May 2012*

120. Sonal Patel (2012) ,The Big picture: coal demand surges, 1st May 2012 *Power-Business and Technology for global generation industry.*

121. S. Mahendra Dev, Post reform regional variation (2004) , *(http://india-seminar.com/2004/)*

122. Small Hydro Power (SHP) Programme ,Government of Himachal *Pradesh-2007*

123. State Government policy for private sector participation in power sector in Jharkhand.

124. State-owned Electricity Distribution Companies: Key Performance Indicators & Credit Perspective-*ICRA rating feature, January 2011.*

125. State power sector performance rating , Final Report to the Ministry of power Government of India ,June 2006, *Joint report by CRISIL rating & ICRA Limited.*

126. Status of reforms in various states , Ministry of power , Government of India

127. Solar Power policy. Government of Uttar Pradesh (2012)

128. State hydel policy for development of small hydro power projects through private sector participation , *Govt of Maharashtra, Sept 2005*

129. Shungulu Committee draft report recommends state regulatory reforms, Indian Power Market, Aug 2011 , *Accessed through web.*

130. State policy on renewable energy sources for generation of additional power, Ministry of Science and Technology , *Govt of Manipur*

131. Shushmul: Power Deficit in India to Attract Private Participation M2 Presswire, August 16, 2010 Newspaper Article *Assessed through Udini Proquest (http://udini.proquest.com/)*

132. Solar Power policy-2009, Energy and Petrochemicals Department, *Govt of Gujarat*

133. Seventeenth Electric Power Survey of India, Central Electricity Authority. *Released 24th May 2007*

134. Taru, Energy: select assignment , *Accessed through web taru.org/pdf/Energy.pdf June 2009*

135. *Thermal power generation development policy 2008 Government of Uttar Pradesh*

136. T.L. Shankar, (ASCI Hydrabad), Dosani et.al. (2004),Power sector reforms in India: Issues relating to agriculture - *IIMB Management Review, pp:93-94*

137. The Small hydro power policy -2007 of Arunachal Pradesh Government – *Gazette Notification (Feb 2008)*

138. The Reform Process and Regulatory Commissions in the Electricity Sector: Developments in Different States of India A Compilation of Selected Papers and Presentations made during the 'Event on the Power Sector Reforms' *-organized by Prayas and Focus on the Global South [December 2000, Mumbai, India]*

139. The Indian power sector - today and tomorrow: *12 Jul 2001,IFLR*

140. Uttar Pradesh Development Report (2004) *Planning Commission, Govt of India.* (Vol-2 Chapter-VII),

141. Uttar Pradesh : State economy and socio economic profile (2007) ,*India brand equity foundation www.ibef.org*

142. Union Budget 2012-13: Impact on the Power sector, Power point Presentation by Grand Thornton -*Business Environment,p-4*

143. Uttar Pradesh power sector reforms, Government of UP policy & power sector reform program.

144. Uttar Pradesh; Nov 2010 , India Brand equity foundation (IBEF) *(www.ibef.org)*

145. Vishwanath V desai (2004) ,Obstacles to private power investment in India,*Asian development bank (ADB) Institute discussion paper No 20 pages 3,6*

146. V. Santhakumar, (2003)Impact of the distribution of the cost of reform on social support for reforms: A study of power sector reforms in Indian states. *India Development Foundation Gurgaon, Haryana pp:9-10*

147. Waquar Ahmed (2007) Neoliberalism and contested policies of the power Industry in India, *The Industrial Geographer, Volume 5, issue 1, p. 44-52 , Penn State University , Geography Department, University Park, PA 16802 USA, pp:1 ,11*

148. World bank report on UP power sector restructuring – Edition 24th March *2000, wds.worldbank.org*

149. Wind Power Policy – 2007 Government of Gujarat, Energy and Petrochemicals Department, *Government Resolution No. EDA1020013054B , June, 2007.*

150. Yin-Fang Zhang, et. al. (2008) Electricity sector reforms in developing countries : An econometric assessment of the effects of privatization , competition and regulation, *University Bedfordshire (UK) ,*

Appendix-A

Questionnaire for Private Electricity (Power) generating companies

Q.1 Please rate the following factors that may have an impact on the sustainability of Private sector Power generation units in the State of Uttar Pradesh (U.P.) on a five point scale.

5= Most important or Significant impact & 1= Least important or Least impact.

Please ✓ mark in the table below.

Sr.No.	Factors affecting sustainability	1	2	3	4	5
a	Implementation of Govt. policy					
b	Investment cost					
c	Fuel Cost					
d	Operation cost					
e	Maintenance Cost					
f	Modernization of transmission & distribution					
g	Govt. being single buyer					
h	Adoption of alternate source of Power generation (wind, solar etc.)					
i	Future demand for electricity (power) due to population growth in U.P.					
j	Future demand for electricity (power) due to economic development in U.P.					
k	Backward integration of fuel supply for fuel security					
l	Cost benefit solution through Gas based power projects					

Q.2 Please rate the impact of the following challenges & problems which private power generating companies may face (on a 5 point scale).

5= Most important or Significant impact &

1= Least important or Least impact.

Please ✓ mark in the table below.

Sr.no	Problems / Challenges	1	2	3	4	5
a	Risk of timely payment by distribution companies in U.P.					
b	Lack of knowledge & experience by private entrepreneurs					
c	Land acquisition problems					
d	Fuel supply problems					
e	Inadequate infrastructure					
f	Bias of state regulator against private sector					
g	Inefficient transmission & distribution system					
h	Inadequate cost recovery					
i	Non payment of power generation bill by the Govt. of U.P.					
j	Load shedding effect on potential of growth					
k	Longer breakeven point (duration)					
l	Geopolitical risk in case of coal assets acquired abroad by the power generating company					
m	Intervention by NGO's					

Q.3 Please rate the following policies of the Government that may impact privatization of Power Generation in Uttar Pradesh on a 5 Point Scale similar to the above.

5= Most important or Significant impact &

1= Least important or Least impact.

Please ✓ mark in the table below.

Sr.No	Aspects related to Policies of the Government	1	2	3	4	5
a	Financial, Promotional & fiscal incentives					
b	Improvement in administration & beaurocratic functioning					
c	Simplification of procedure					
d	Reduction in Administrative Delays					
e	End of License Raj					
f	Overall policies of the Govt. of UP					

Q.4 What should be the best Public - Private Partnership in case of a joint venture,

a. 20% -80%

b. 30%-70%

c.40%-60%

d.49%-51%

e. Any other (please specify) ....

Q.5 What can be the equity participation between foreign & Indian company in power generation.

a.20% -80%

b. 30%-70%

c.40%-60%

d.49%-51%

e. Any other (please specify).....

Q.6 What should be the alternative mode of Private Sector of participation.

a. BOOT (Built, Own , Operate ,Transfer)

b. BOT (Built, Operate , Transfer)

c. BLT (Built, Lease ,Transfer)

d. Complete privatization

e. Any other (please specify) .....

For Company profile of respondents.

1. Name of the Manager

2. Designation

3. Name & Address of the Company

4. Origin of Company: Indian/Foreign

Appendix-B

Questionnare for End consumers of Power (Electricity)

In view of the power crisis in the State of Uttar Pradesh, power generation by private sector participation may be a solution to the problem. As there can be various issues related to this plan, your views are solicited to understand the subject in greater detail depending upon your responses.

1=Strongly disagree, 2= Disagree, 3= Neither agree nor disagree, 4=Agree 5=Strongly agree

Please rate the following factors on a 5 point scale by marking [✓].

Sr.No	Aspects	1	2	3	4	5
a	Market driven (non subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P.					
b	Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P.					
c	Large size plants/further capacity addition of power plants will have environmental impacts					
d	Due to high capital investment there may be rise in tariff under open market (non subsidized pricing) system.					
e	Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization					
f	Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price -non subsidized mechanism) is a better option					
g	Private companies in power generation would have stronger incentive to comply with					

	quality standards and other regulatory obligations					
h	Privatization should be done first for transmission / distribution before privatization of generation in U.P.					
i	Power deficit can be reduced by addition of power generation capacity by private companies.					

Q2 Upto what extra price you can afford (in Rs per unit additional, on the present price of power supply) for a very good quality power on continuous basis.

a) Rs 1, b) Rs 2 , c) Rs 3, d) Rs 4, e) Any other (pl specify)....

Q3 Upto what extra price you can afford (in Rs per unit additional, on the present price of power supply) for a moderate quality power on continuous basis.

a) Rs 1, b) Rs 2, c) Rs 3, d) Rs 4, e) Any other (pl specify)....

Profile of Consumer

a. Name

b. Age

c. Occupation

d. Name of City / District

e. Monthly Income upto Rs 10,000,

10,000-20,000

20,000-35,000

35,000-50,000

Above 50,000

Appendix-C

Summary & Analysis of the data from power generation companies

Factors affecting sustainability (On Likert Scale)	**1**	**2**	**3**	**4**	**5**	**Mean value**
Implementation of Govt. policy	1	1	0	5	9	4.25
Investment cost	1	1	4	4	6	3.81
Fuel Cost	1	1	3	3	8	4.00
Operation cost	0	1	7	3	5	3.75
Maintenance Cost	0	3	7	1	5	3.50
Modernization of transmission & distribution	0	0	3	7	6	4.19
Govt. being single buyer	0	1	1	9	5	4.13
Future demand for electricity (power) due to population growth in U.P.	1	0	3	6	6	4.00
Future demand for electricity (power) due to economic development in U.P.	2	1	2	6	5	3.69
Cost benefit solution through Gas based power projects	2	1	4	4	5	3.56
Problems & Challenges that confront private sector participation	**1**	**2**	**3**	**4**	**5**	**Mean value**
Risk of timely payment by distribution companies in U.P.	2	0	0	2	12	4.75
Lack of knowledge & experience by private entrepreneurs	0	6	6	3	1	2.94
Land acquisition problems	1	1	1	5	8	4.13
Fuel supply problems	1	1	1	7	6	4.00
Inadequate infrastructure	0	2	0	7	7	4.19
Inefficient transmission & distribution system	0	0	3	7	6	4.19
Inadequate cost recovery	1	0	2	6	7	4.13
Bias of state regulator against private sector	0	1	2	8	5	4.06

Non payment of power generation bill by the Govt. of U.P.	1	1	0	4	10	4.31
Load shedding effect on potential of growth	0	0	4	8	4	4.00
Longer breakeven point (duration)	1	1	2	6	6	3.94
Geopolitical risk in case of coal assets acquired abroad by the power GENCO	1	1	2	8	4	3.81
Intervention by NGO's	0	0	6	8	2	3.75
Aspects related to Policies of the Government	**1**	**2**	**3**	**4**	**5**	**Mean value**
Financial, Promotional & fiscal incentives	0	1	4	4	7	4.06
Improvement in administration & beaurocratic functioning	0	2	1	3	10	4.31
Simplification of procedure	0	2	3	4	7	4.00
Reduction in Administrative Delays	0	1	3	2	10	4.31
End of License Raj	0	1	2	5	8	4.25
Overall policies of the Govt. of UP	0	1	2	5	8	4.25
Measures by which pvt sector participation could be increased	**1**	**2**	**3**	**4**	**5**	**Mean value**
Backward integration of fuel supply for fuel security	1	2	2	7	4	3.69
Adoption of alternate source of Power generation (wind, solar etc.)	1	1	4	6	4	4.19
Other survey questions						
Best Public - Private Partnership in case of a joint venture,	20-80%	30-70 %	40-60%	49-51%	Other	
	4	3	1	8	0	
Equity participation between foreign & Indian company in power generation.	20-80%	30-70 %	40-60%	49-51%	Other	
	3	5	1	5	2	
Alternative mode of Private Sector of participation.	BOOT	BOT	BLT	Complete pvt	Other	
	7	2	1	6	0	

विद्युत उपभोक्ता हेतु प्रश्नावली

यह एक व्यक्तिगत सर्वेक्षण है जो कि, शैक्षिक कार्यक्रम उपयोंग हेतु बनाया गया है । इस सर्वेक्षण में आपका सहयोग अपेक्षित है । उत्तर प्रदेश मे विद्युत आपूर्ति की स्थिति को देखते हुए निजी क्षेत्र की विद्युत उत्पादन कंपनियो की सहभागिता इस समस्या के समाधान हेतु सहायक हो सकती है । चुंकि इस परिप्रेक्ष्य मे बहुत सारे तथ्य और विचार हो सकते है । यह सर्वेक्षण आपके विचारो द्वारा इस विषय को पूर्ण रूप से समझने मे सहायक होगें, अतः अपने विचार दिऐ गये प्रश्नो के उत्तरो के मध्यम से व्यक्त करें ।

प्र.1 निम्नलिखित व्यक्तव्यों को 1 से 5 के स्केल पर जॉच कर उचित उत्तर दर्शाएं ।

1. पूर्ण रूप से असहमत (Strongly disagree)
2. असहमत (Disagree)
3. सहमत या असहमत (Neither agree nor disagree) नहीं
4. सहमत (Agree)
5. पूर्ण रूप से सहमत (Strongly agree)

		1	2	3	4	5
a.	खुले बाजार की विद्युत दरों (नॉन सब्सीडी) से उ.प्र. मे विद्युत की आपूर्ति और उपलब्धता सुनिश्चित की जा सकती है ।					
b.	विद्युत उत्पादन एवं वितरण की खराब स्थिती को देखते हुए उ.प्र. मे तुरंत निजीकरण होना आवश्यक है ।					
c.	बडी क्षमता के विद्युत संयत्रो से अथवा नए बडे संयत्रो के लगाने से पर्यावरण पर सीधा प्रभाव पडेंगा ।					
d.	विद्युत उत्पादन हेतु बडे पूंजी निवेश से खुले बाजार की विद्युत दरो मे (छूट न मिलने पर) बढोतरी हो सकती है।					
e.	विद्युत दरो मे मिलने वाली छूट निजीकरण के बाद भी जारी रहनी चाहिए।					
f.	विद्युत दरो का निर्धारण प्राइस ब्रॅड विधि (पहले कुछ युनिट तक छूट पर अर्थात सब्सीडी युक्त और बाद के युनिट वास्तविक दरों पर) होना एक अच्छा विकल्प है।					
g.	निजी क्षेत्र की विद्युत उत्पादन कंपनियॉ गुणवत्ता मानकः बनाए रखने एवं अन्य विनियामक दायित्वो के पालन करने मे बेहतर होंगी।					
h.	विद्युत संचरण एवं वितरण क्षेत्र का निजीकरण उत्पादन क्षेत्र के निजीकरण से पहले होना चाहिए।					
i.	विद्युत आपूर्ति की कमी को विद्युत उत्पादन क्षेत्र के निजीकरण द्वारा पूरा किया जा सकता है ।					

प्र. 2 एक बहुत अच्छे गुणवत्ता वाले सतत आधार पर उपलब्ध विद्युत आपूर्ति के लिऐ आप कितना अतिरिक्त व्यय कर सकते है । (वर्तमान दरो के अतिरिक्त वृद्दि रू. प्रति यूनिट बिजली)

1. रू. 1
2. रू. 2
3. रू. 3
4. रू. 4
5. इससे अलग .....

प्र. 3 एक मध्यम गुणवत्ता की सतत आधार पर उपलब्ध विद्युत आपूर्ति के लिऐ आप कितना अतिरिक्त व्यय कर सकते है । (वर्तमान दरो के अतिरिक्त वृद्दि रू. प्रति यूनिट बिजली)

1. रू. 1
2. रू. 2
3. रू. 3
4. रू. 4
5. इससे अलग .....

उपभोक्ता का विवरण

नाम :.....

उम्र :.....

व्यवसाय :.....

शहर /जिले का नाम :.....

मसिक आम रू. 10,000 तक

रू. 10,000 - 20,000

रू. 20,000 - 35,000

रू. 35,000 - 50,000

रू. 50,000 से अधिक

(सहयोग के लिए धन्यवाद)